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### SPECIAL FEATURES

This microcard contains the trouble-shooting instructions for the LU-Jetronic for the following vehicles current at the time of writing.

Renault 18, Fuego, Break with 2.2 1/4-cyl. engine in US version starting from 10.83.



## RAPID DIAGNOSIS CHART FOR UNIVERSAL TEST ADAPTER

Use

- Universal test adapter      0 684 101 801 and
- Adapter cable                1 684 463 123.

The following rapid diagnosis chart makes it possible for the experienced L-Jetronic specialist to rapidly test the electrical part of the system using the universal test adapter.

The rapid diagnosis chart contains the following information:



- Test-step sequence
- Position of the V- and  $\Omega$ - program switch
- Remarks on the operation of the universal test adapter and other components
- Test specifications for motortester and multimeter

**A2**

Rapid diagn. chart for univ. test adapt.  
Renault R 18, Fuego, Break



# Rapid diagnosis chart for universal test adapter

Test step	Switch position		Measurement	Remarks	Test specifications (reading)
	V	$\Omega$			
1	5	-	Voltage pulse from ignition coil term. 1 Control-unit plug term. 1 to term. 5.	Disengage gear and start.	Ignition pulse on oscilloscope
2	6	-	Voltage from control relay term. 87. Control-unit plug term. 9 to term. 5	Disengage gear and start.	8 ... 15 V
3	7	-	Voltage from starting motor term. 50. Control-unit plug term. 4 to term. 5.	Disengage gear and start.	8 ... 15 V
4	8	-	Voltage from altitude sensor term. 11. Control-unit plug term. 11 to term. 5.	Disengage gear and start. Air pressure: 980 mbar ( $\approx$ 300 m above sea level) 615 mbar ( $\approx$ 4000 m above sea level)	2 ... 4 V 8 ... 12 V
5		11	Resistance of temperature sensor NTC I in air-flow sensor term. 8. Control-unit plug term. 8 to term. 5.	---	100 ... 200 $\Omega$
6		12	Resistance of potentiometer in air-flow sensor term. 7. Control-unit plug term. 7 to term. 5.	Deflect sensor flap all the way to stop.	60 ... 1000 $\Omega$
7		13	Resistance of temperature sensor NTC II term. 10 (engine temperature). Control-unit plug term. 10 to term. 5	+ 15°C ... + 30°C + 80°C	1.3 ... 3.6 k $\Omega$ 250 ... 390 $\Omega$
8		14	Resistance of ground output stage term. 13. Control-unit plug term. 13 to term. 5.	----	0 ... 10 $\Omega$
9		16	Resistance of idle contact in throttle-valve switch term. 2. Control-unit plug term. 2 to term. 9	Accelerator pedal at rest Depress accelerator pedal slightly	0 ... 10 $\Omega$ $\infty$ $\Omega$
10		17	Resistance of full-load contact in throttle- valve switch term. 3. Control-unit plug term. 3 to term. 9.	Depress accelerator pedal all the way Depress accelerator pedal slightly	0 ... 10 $\Omega$ $\infty$ $\Omega$
11		18	Resistance of all 4 parallel-connected solenoid-operated injection valves term. 12. Control-unit plug term. 12 to term. 9.	---	+ 20°C: 7.0...9.5 $\Omega$ + 80°C: 7.2...10.0 $\Omega$

**A3**

Rapid diagn. chart for univ. test adapt.  
Renault R 18, Fuego, Break



**A4**

Rapid diagn. chart for univ. test adapt.  
Renault R 18, Fuego, Break



### Necessary additional wiring tests

These leads were not tested by the universal test adapter in rapid diagnosis.

- From control-unit plug term. 9 to auxiliary-air device plug term. 9/2.
- From control-unit plug term. 5 to auxiliary-air device plug term. 26.
- From control relay term. 28 to electric fuel pump term. 28.
- From electric fuel pump term. 61 to vehicle ground.





## TEST SPECIFICATIONS

### Pressure regulator

- Fuel pressure: 2.8...3.2 bar

### Electric fuel pump

- Delivery quantity at return line: at least 700 cm<sup>3</sup>/30 s
- Connection voltage under load: at least 12 V

### Thermo-time switch (35°/8s):

● Electrical internal resistance at:	Between term. "G" and ground	Between term. "W" and ground	Between terms. "G" and "W"
Ambient temperature (below +30°C)	25...40Ω	0Ω	25...40Ω
Engine at normal operating temperature (above +40°C)	50...80Ω	100...160Ω	50...80Ω

### Start valve

- Electrical internal resistance: 3.5...4.5 Ω
- Sealing: maximum permissible 1 drop/min

### Auxiliary-air device

- Electrical internal resistance: 30...65 Ω

### Temperature sensor II (engine)

- Electrical internal resistance at:
  - Ambient temperature (+15°C...+30°C): 1.3...3.6 kΩ
  - Engine at normal operating temperature (approx. +80°C): 250...390 Ω

### Air-flow sensor

- Resistance between:
  - Terms. 8 and 5: 340...450 Ω
  - Terms. 7 and 5: (fully deflect sensor flap) 60...1000Ω
  - Terms. 9 and 5: 500...760 Ω
  - Terms. 8 and 9: 160...300 Ω



### Solenoid-operated fuel-injection valve

- Electrical internal resistance at +20°C: 15.0...17.5  $\Omega$

### Pressure sensor (altitude sensor)

- Resistance between terms. 2 and 3: 2300...2500  $\Omega$

### Pressure-jump switch

- Resistance at atmospheric pressure and with vacuum:  $\infty\Omega$   
With brief ventilation: 0 $\Omega$

### Idle-speed adjustment (engine at operating temperature, approx. +80°C)

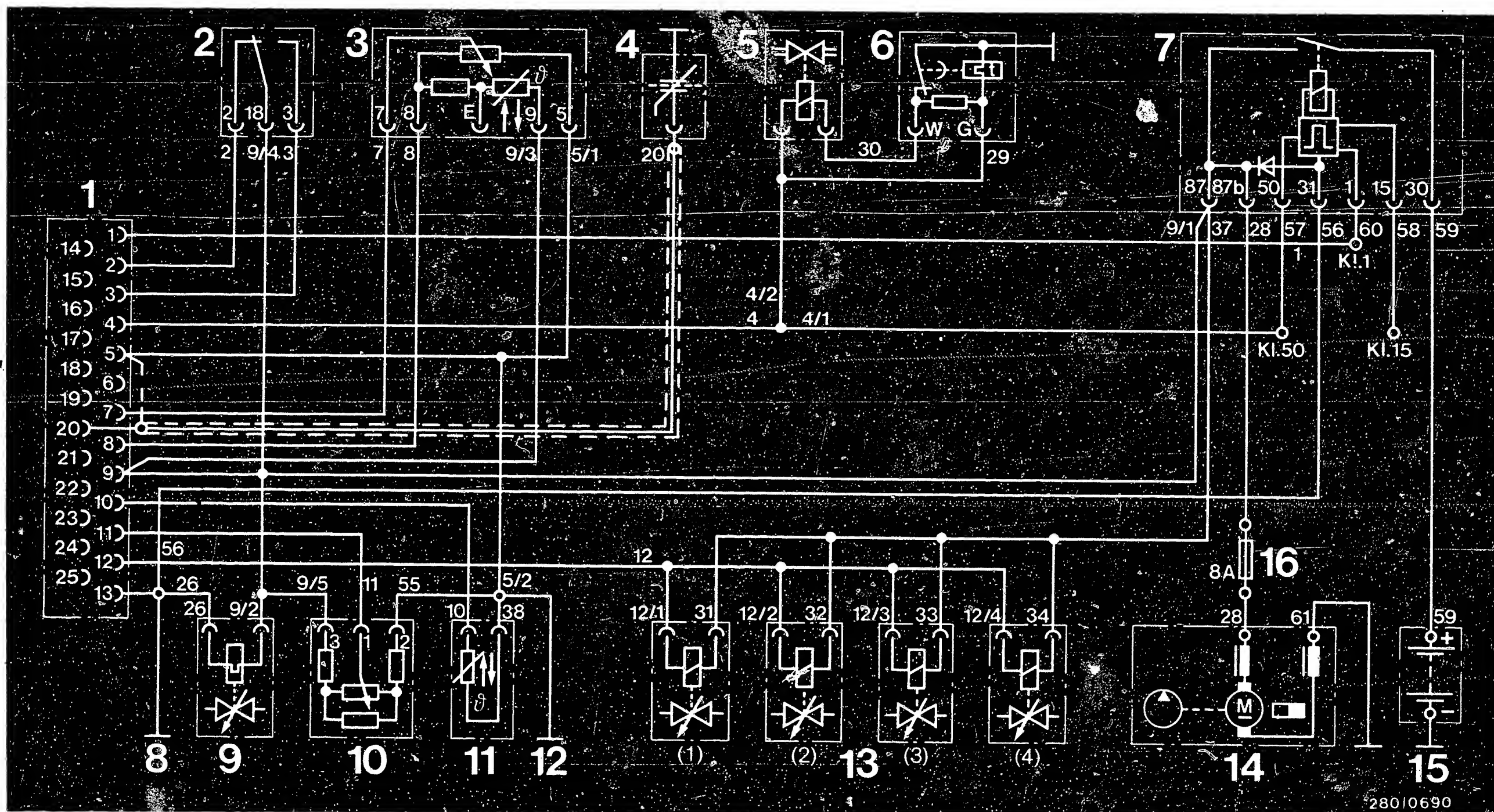
- Idle speed, manual transmission: 750...800 min<sup>-1</sup>  
Automatic transmission (selector lever in D position): 700...750 min<sup>-1</sup>
- CO adjustment (via lambda closed-loop control)  
Closed-loop operation, sensor connected: Voltage reading oscillates between 2 values.  
  
Open-loop operation, sensor lead disconnected: Voltage should be mean value of two values measured previously.

### lambda closed-loop control (use closed-loop control tester KDJE-P 600)

- Rich-running stop, disconnect sensor lead and connect to ground on control-unit side: 10...12 V
- Lean-running stop, connect end of lead to 2 V: approx. 0.5 V

For setting values for ignition, valve play, and other technical engine data, see equipment and Autodata microcard.





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# ELECTRICAL TERMINAL DIAGRAM

- |   |                          |
|---|--------------------------|
| 1 = Multi-contact plug for control unit | 5 = Start valve          |
| 2 = Throttle-valve switch               | 6 = Thermo-time switch   |
| 3 = Air-flow sensor                     | 7 = Control relay        |
| 4 = Lambda sensor                       | 8 = Ground output stage  |
|   | 9 = Auxiliary-air device |

- |   |  |
|---|--|
| 10 = Pressure sensor (altitude sensor)          | 13 = Solenoid-operated fuel-injection valves |
| 11 = Temperature sensor II (engine temperature) | 14 = Electric fuel pump                      |
| 12 = Electronics ground                         | 15 = Battery                                 |
|   | 16 = Pump fuse                               |

**A8**

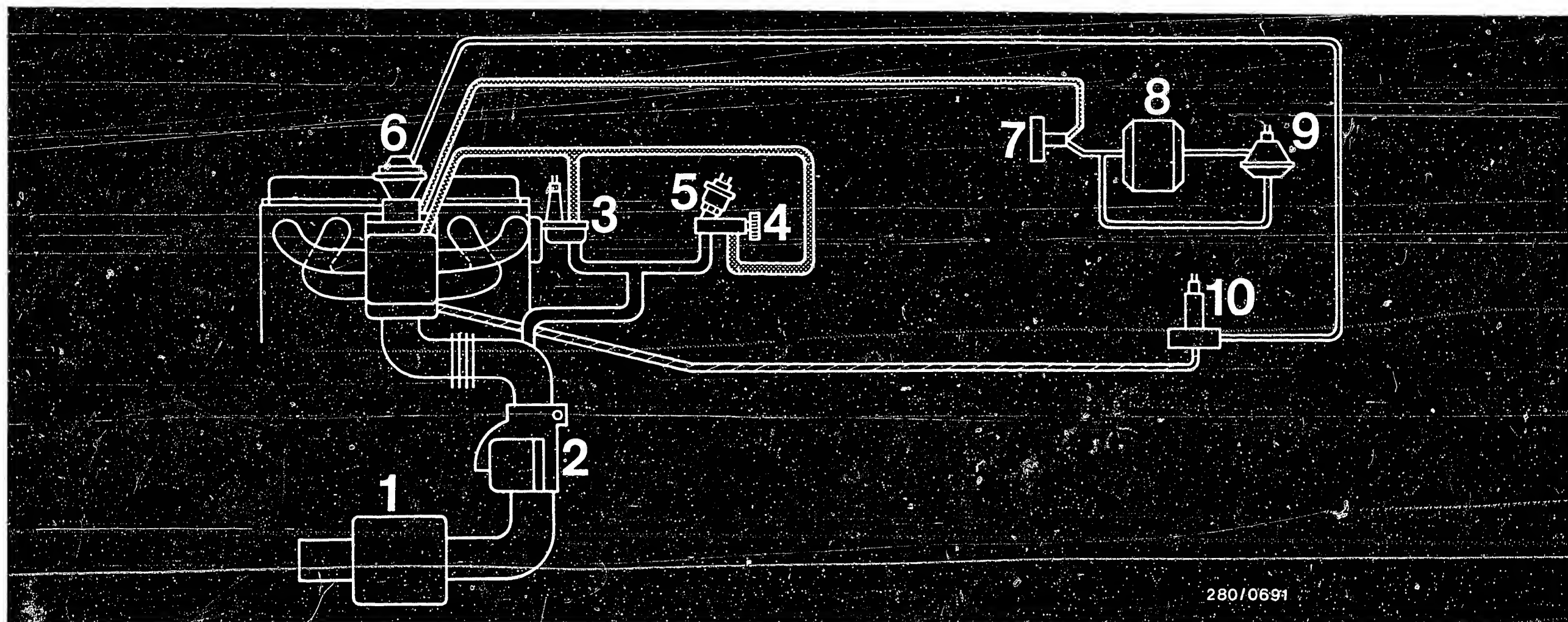
Electrical terminal diagram  
Renault R 18, Fuego, Break



**A9**

Electrical terminal diagram  
Renault R 18, Fuego, Break





# AIR-LINE DIAGRAM

## ● Jetronic

- 1 = Air filter
- 2 = Air-flow sensor
- 3 = Auxiliary-air device on water-heated plate
- 4 = Separate idle-speed adjusting screw
- 5 = Auxiliary-air valve

## ● Exhaust-gas recirculation

- 6 = Exhaust-gas recirculation valve
- 7 = Thermo-valve, water-heated
- 8 = Accumulator
- 9 = Pressure-jump switch
- 10 = Electro-pneumatic valve

- == = Atmospheric pressure
- ~~~~ = Intake-manifold pressure
- /// = Intake-manifold pressure at part load

**A10**

Air-line diagram

Renault R 18, Fuego, Break

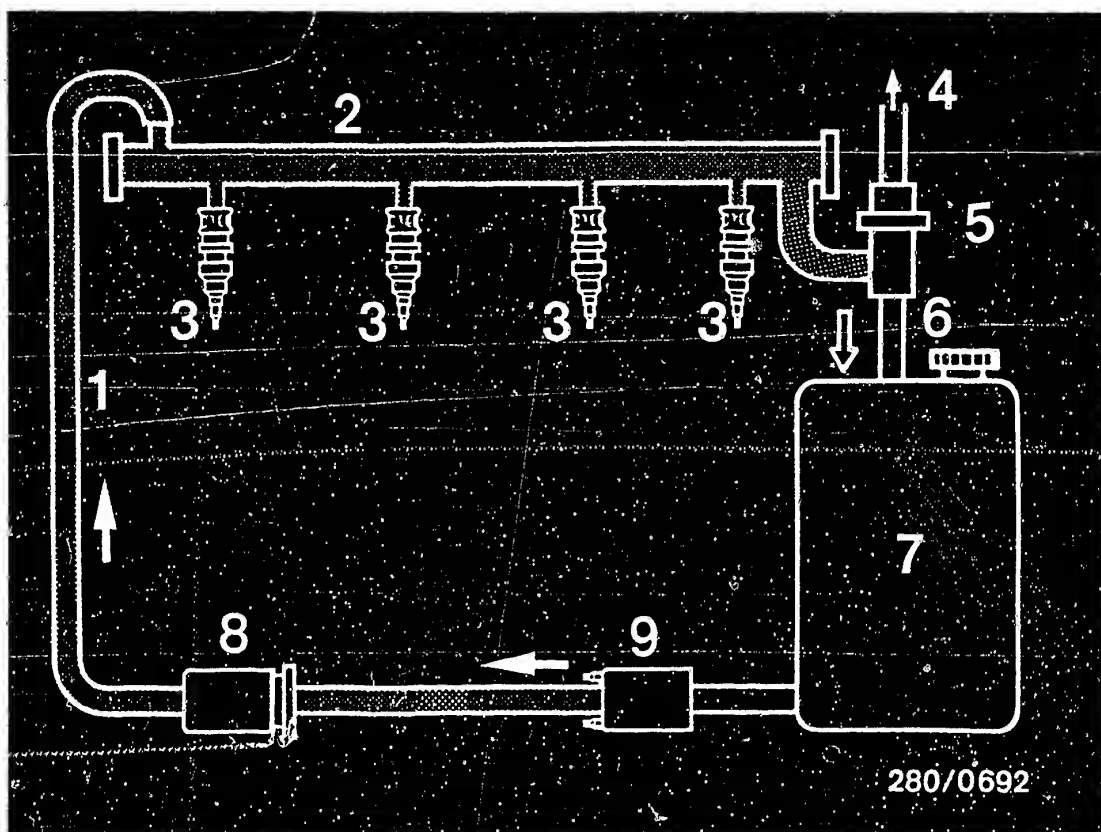


**A11**

Air-line diagram

Renault R 18, Fuego, Break





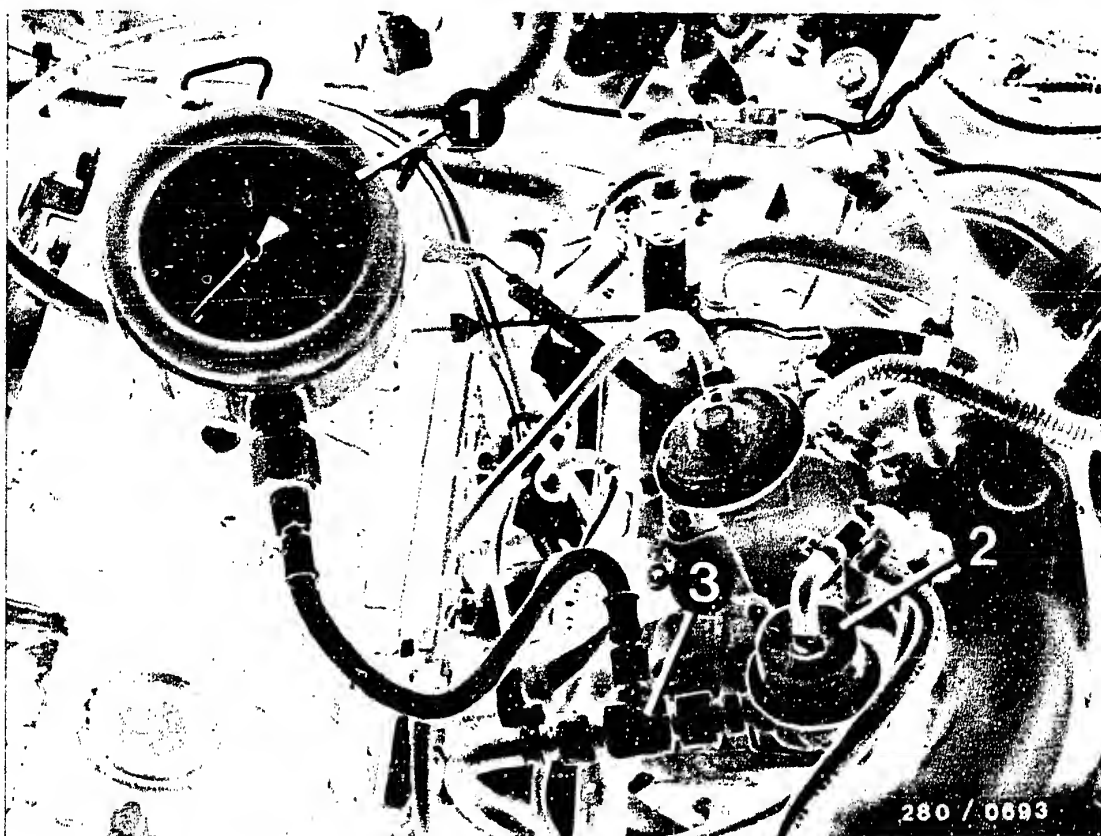
### FUEL-LINE DIAGRAM

== Not pressurized

≡ Fuel pressure

- 1 = Delivery line
- 2 = Fuel-distribution pipe
- 3 = Solenoid-operated fuel-injection valves
- 4 = Intake-manifold pressure connection
- 5 = Pressure regulator
- 6 = Return line
- 7 = Fuel tank
- 8 = Fuel filter
- 9 = Electric fuel pump





- 1 = Pressure gauge with hose line (KDJE-P 100)
- 2 = Pressure regulator
- 3 = Union KDJE-P 100/14

### Testing fuel pressure

Use the pressure gauge and hose line of pressure-measuring device KDJE-P 100 for pressure measurement.

Connect union KDJE-P 100/14 between the pressure regulator and its delivery line, and connect the hose line with pressure gauge at the side threaded connection.



## SPECIAL FEATURES

- L-Jetronic (version LU) with 25-pin control unit, 5-pin air-flow sensor, 7-pin control relay, and solenoid-operated fuel-injection valves with brass wire coils.
- Pressure sensor for altitude correction. Active in all control phases of lambda closed-loop control, e.g. control during the warm-up phase or under full load.
- lambda sensor with lambda closed-loop control and three-way catalytic converter for low-pollutant exhaust when used in conjunction with unleaded fuel.
- Exhaust-gas recirculation with:
  - Exhaust-gas recirculation valve
  - Thermo-valve, water-heated
  - Accumulator
  - Pressure-jump switch
  - Electro-pneumatic valve

When the (hot) engine is accelerated in the part-load range, the exhaust is recirculated.

When the engine is at operating temperature, the water-heated thermo-valve is open, and manifold pressure acts upon the accumulator and the pressure-jump switch. When acceleration takes place in the part-load range, the contact in the pressure-jump switch closes for a period of time determined by means of the accumulator. This supplies voltage to the electro-pneumatic valve. The manifold pressure is released, acts on the exhaust-gas recirculation valve, and causes it to open.





## ● Testing

- Thermo-valve:

Cold: Closed, no manifold pressure at outlet

Hot: Open, manifold pressure at outlet

- Accumulator: Check sealing with Mityvac manual vacuum pump.

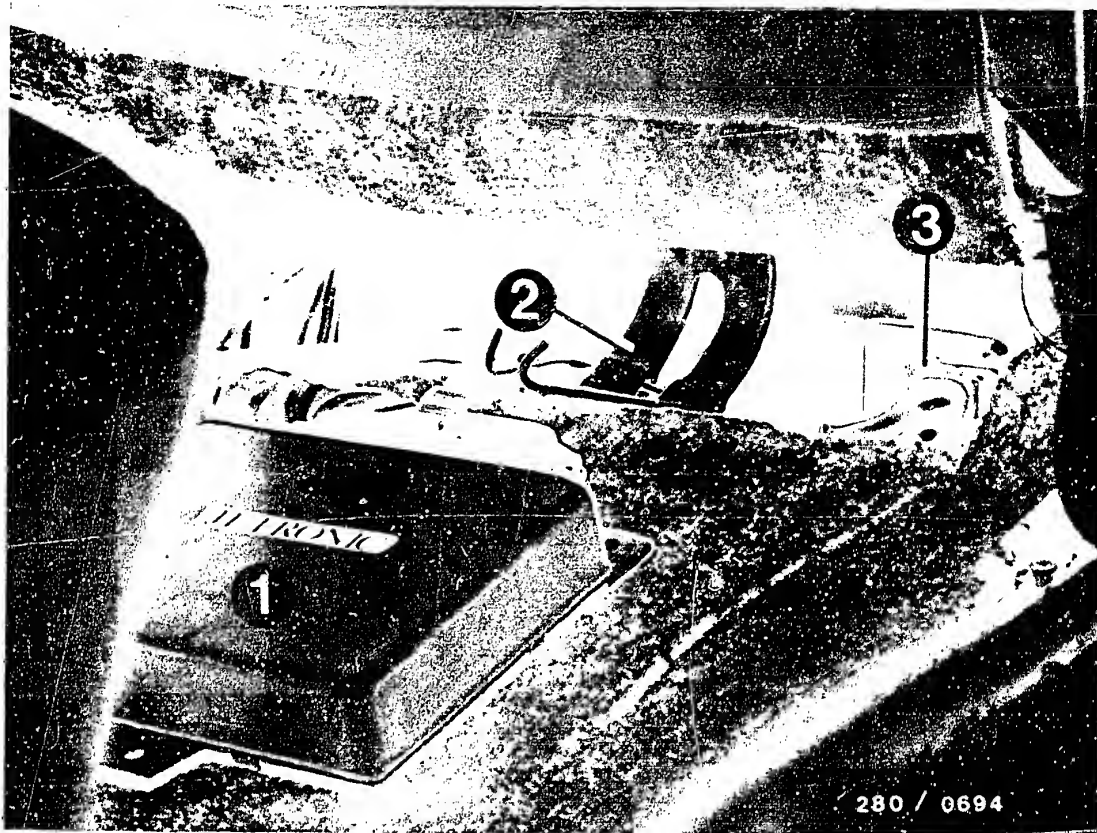
- Pressure-jump switch: Test using ohmmeter and Mityvac manual vacuum pump.

If vacuum or atmospheric pressure is applied to the pressure-jump switch, the contact is open ( $\infty\Omega$ ).

Additional air pressure causes the pressure-jump switch to close the contact ( $0\Omega$ ) for a short period.







- 1 = Control unit
- 2 = Rubber holder
- 3 = Pressure sensor (altitude sensor)

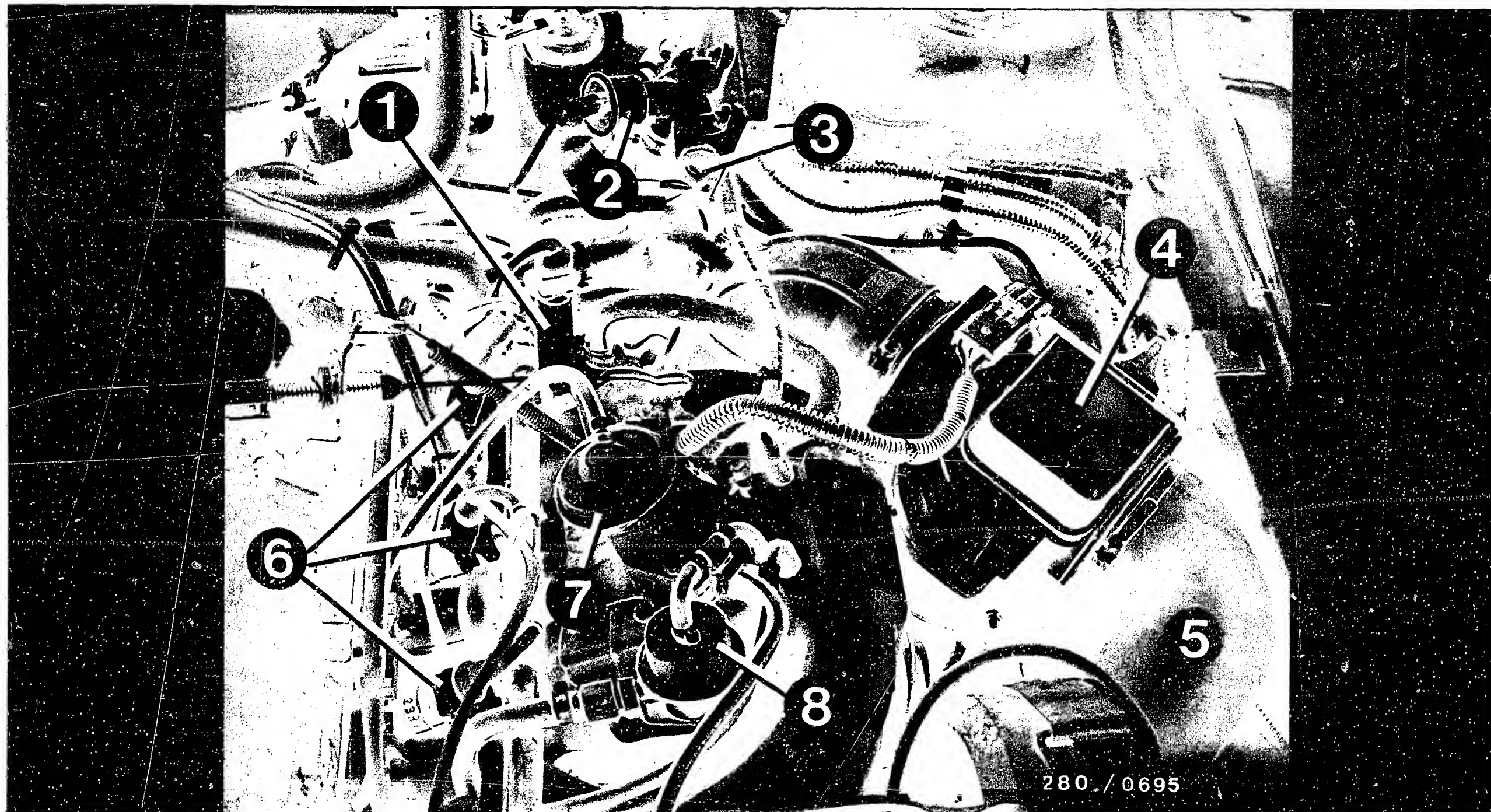
#### INSTALLATION POSITION OF COMPONENTS

The control unit is on the vehicle floor, affixed beneath the front passenger seat.

**A16**

Installation position of components  
Renault R 18, Fuego, Break





- 1 = Auxiliary-air device
- 2 = Auxiliary-air valve
- 3 = Separate idle-speed adjusting screw
- 4 = Air-flow sensor

- 5 = To air filter
- 6 = Fuel-injection valves
- 7 = Exhaust-gas recirculation valve
- 8 = Pressure regulator

**A17**

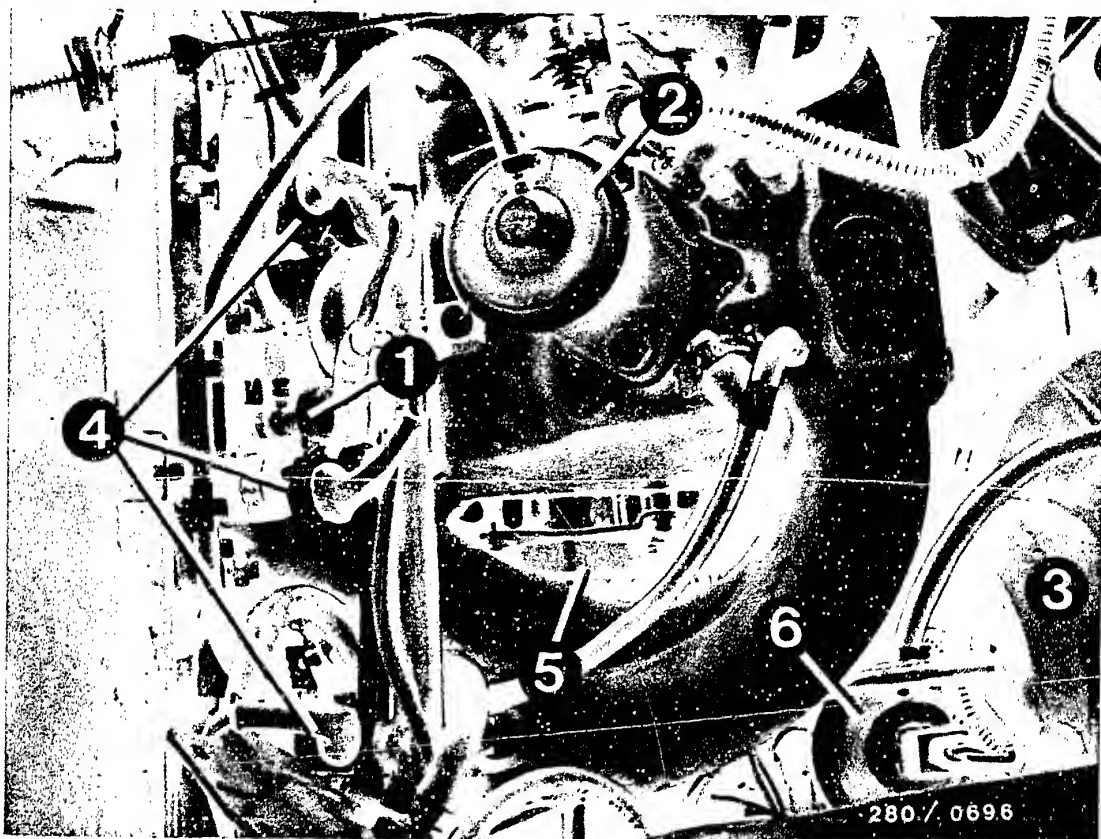
Installation position of components  
Renault R 18, Fuego, Break



**A18**

Installation position of components  
Renault R 18, Fuego, Break





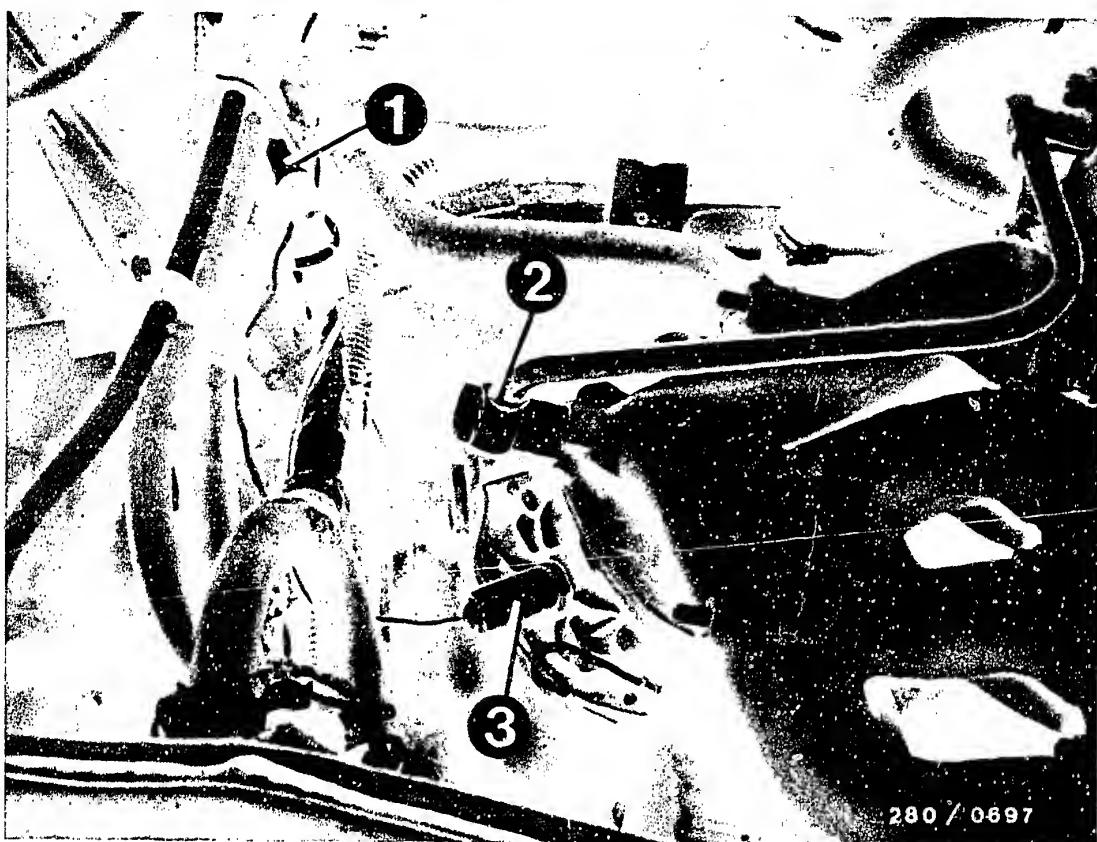
- 1 = Start valve
- 2 = Exhaust-gas recirculation valve
- 3 = Accumulator
- 4 = Fuel-injection valves
- 5 = Throttle-valve switch  
(pressure regulator has been removed in this illustration)
- 6 = Pressure-jump switch

**A19**

Installation position of components

Renault R 18, Fuego, Break





- 1 = Plug connection for lambda-sensor lead
- 2 = Exhaust-gas extraction for exhaust-gas recirculation
- 3 = Lambda sensor

**A20**

Installation position of components  
Renault R 18, Fuego, Break



- Thermo-time switch

The thermo-time switch is bolted on at the cylinder head at the front left, in front of the fuel-injection valve for cylinder 1.

- Ground leads

The electronics and output ground leads of the control unit are bolted onto the intake manifold on the bottom left, next to the air-flow sensor.

- Temperature sensor II (engine temperature)

The temperature sensor is bolted on at the coolant distributor, on the cylinder head at the right front.

- Control relay

The control relay is fastened in the engine compartment to the right on the firewall, and protected from contamination by a metal covering plate.

- Fuel-supply system components

- Electric fuel pump and fuel filter

Both components are fastened with clamps to the side member on the bottom of the vehicle to the right in front of the rear axle.



# T A B L E   O F   C O N T E N T S

## Section

## Coordinates

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## SPECIAL FEATURES

- This microcard contains the L-Jetronic trouble-shooting instructions for the following Renault models applicable at this writing:

Fuego Turbo (S/CH) 9.83 →  
R 18 Turbo (S/CH) 9.83 →

- L-Jetronic with 35-pin control unit 0 280 000 215, energized from term. 1 of ignition coil. 5-pin air-flow sensor and 7-pin control relay.
- Pressure sensor for altitude correction.
- Full-load pressure switch for intake-manifold-pressure dependent enrichment above 300 mbar gauge pressure.
- Charge-air pressure switch limits charging pressure to 1100 ... 1200 mbar gauge pressure.
- EGR with intake-manifold-pressure-controlled EGR valve, controlled by pressure-jump switch with accumulator and electro-pneumatic valve.

### Note:

The L-Jetronic in these Renault models essentially corresponds to that of the Opel 2.5 l / 3.0 l / 6 cylinder models.

Basis microcard for detailed trouble-shooting:

OPE - 501

### Important:

When referring to a basis microcard, note that test values must always be taken from the Brief Instructions for the pertinent vehicle.





## RAPID DIAGNOSIS CHART FOR UNIVERSAL TEST ADAPTER

- Universal Test Adapter 0 684 101 801 and
- Adapter Lead 1 684 463 129

The following rapid diagnosis chart enables the experienced L-Jetronic specialist to rapidly check the electric portion of the system with the universal test adapter.

The rapid diagnosis chart contains the following information:

- Test step sequence
- Position of V- and  $\Omega$ -program switches
- Notes on the operation of the universal test adapter or other components.
- Test values for engine tester and multimeter





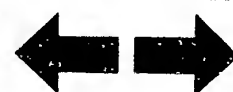
# Rapid Diagnosis Chart for Universal Test Adapter

Testing L-Jetronic with Adapter Lead 1 684 463 129

Test Step	Switch Position		Measurement	Control Unit Plug between Terminals	Note	Test Value (Reading)
	V	$\Omega$				
1	3	-	Voltage from ignition and starting switch term. 50.	4 and 5	Shift gear to neutral, start.	<u>8 ... 15 V</u>
2	4	-	Voltage from control relay term. 87b via auxiliary-air device	34 and 5	Shift gear to neutral, start.	<u>8 ... 15 V</u>
3	5	-	Voltage pulses from ignition coil term. 1	1 and 5	Shift gear to neutral, start	Ignition pulses on oscilloscope
4	6	-	Voltage from main relay term. 87b	10 and 5	Ignition "ON".	<u>8 ... 15 V</u>
5	7	-	Voltage from 1st solenoid-operated injection valve term. 15	15 and 5	Ignition "ON".	<u>8 ... 15 V</u>
6	8	-	Voltage from 2nd solenoid-operated injection valve term. 33	33 and 5	Ignition "ON".	<u>8 ... 15 V</u>
7	9	-	Voltage from 3rd solenoid-operated injection valve term. 32	32 and 5	Ignition "ON".	<u>8 ... 15 V</u>
8	10	-	Voltage from 4th solenoid-operated injection valve term. 14	14 and 5	Ignition "ON".	<u>8 ... 15 V</u>
9	12	-	Voltage from main relay term. 87	29 and 5	Ignition "ON".	<u>8 ... 15 V</u>

**C4**

Rapid Diag. Chart f. Univ. Test Adap.  
Renault



**C5**

Rapid Diag. Chart f. Univ. Test Adap.  
Renault



# Rapid Diagnosis Chart for Universal Test Adapter

Testing L-Jetronic with Adapter Lead 1 684 463 129 (Continuation)

Test Step	Switch Position		Measurement	Control Unit Plug between Terminals	Note	Test Value (Reading)
	V	$\Omega$				
10	↓	6	Resistance of potentiometer, wiper in air-flow sensor term. 7.	7 and 5	Tilt sensor flap to stop.	<u>80 ... 600 <math>\Omega</math></u>
11	↓	7	Resistance of potentiometer, total resistance in air-flow sensor term. 8.	8 and 5	---	<u>260 ... 520 <math>\Omega</math></u>
12	↓	8	Series resistance and potentiometer total resistance in air-flow sensor term. 9.	9 and 5	Disconnect 3-pin plug from pressure sensor (altitude sensor).	<u>400 ... 800 <math>\Omega</math></u>
13	↓	9	Resistance of idle contact in throttle-valve switch term. 2.	2 and 18	Accelerator in rest position:	<u>0 ... 10 <math>\Omega</math></u>
					Accelerator slightly depressed:	<u><math>\infty</math> <math>\Omega</math></u>
14	↓	10	Resistance of full-load contact in throttle-valve switch term. 3.	3 and 18	Accelerator in full-load position:	<u>0 ... 10 <math>\Omega</math></u>
					Accelerator in rest position:	<u><math>\infty</math> <math>\Omega</math></u>
15	↓	10	Resistance of full-load pressure switch term. 3	3 and 18	Accelerator in rest position, apply 250...300 mbar gauge pressure to full-load pressure switch	<u>0 ... 10 <math>\Omega</math></u>
16	↓	11	Resistance of temperature sensor NTC I in air-flow sensor term. 27.	27 and 5	---	at +15°C...+30°C: <u>1.45...3.3 k<math>\Omega</math></u> at approx. +80°C: <u>280...360 <math>\Omega</math></u>

**C6**

Rapid Diag. Chart f. Univ. Test Adap.

Renault



**C7**

Rapid Diag. Chart f. Univ. Test Adap.

Renault



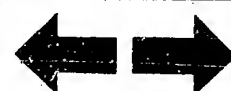
# Rapid Diagnosis Chart for Universal Test Adapter

Testing L-Jetronic with Adapter Lead 1 684 463 129 (Continuation)

Test Step	Switch Position		Measurement	Control Unit Plug between Terminals	Note	Test Value (Reading)
	V	$\Omega$				
17	↓	12	Resistance of temperature sensor NTC II term. 13 (engine temperature)	13 and 5	---	at +15°C...+30°C: 1.3...3.6 k $\Omega$ at approx. +80°C: 250...390 $\Omega$
18	↓	13	Final stage ground resistance term.16	16 and 5	---	0 ... 10 $\Omega$
19	↓	14	Final stage ground resistance term.17	17 and 5	---	0 ... 10 $\Omega$
20	↓	15	Shielding, cable 1 resistance term.35	35 and 5	Connect end of shielding (at ignition coil) with ground	0 ... 10 $\Omega$
21	↓	16	Resistance of charge-air pressure switch term. 26	26 and 5	Apply 1100...1200 mbar gauge pressure to charge-air pressure switch	0 ... 10 $\Omega$
22	↓	8	Resistance of pressure sensor, total resistance term. 2 and term. 3 of pressure sensor	9 and 5	Detach 5-pin plug from air-flow sensor	2.3 ... 2.8 k $\Omega$
23	↓	19	Resistance of pressure sensor, wiper resistance term. 1 and term. 2 of pressure sensor	12 and 5	Detach 5-pin plug from air-flow sensor. Resistance is non-linear.	at 977 mbar (approx. 300 m altitude) 2.0 ... 2.5 k $\Omega$
						at 616 mbar (approx. 4000 m altitude) 2.2 ... 2.7 k $\Omega$

**C8**

Rapid Diag. Chart f. Univ. Test Adap.  
Renault



**C9**

Rapid Diag. Chart f. Univ. Test Adap.  
Renault



## Rapid Diagnosis Chart for Universal Test Adapter (Continuation)

### Note:

The following components with their respective connecting leads are not covered by the universal test adapter during rapid diagnosis:

- |  |   |
|--|---|
| 1. Solenoid-operated cold-start valve, | Connecting leads 45 and 46                      |
| 2. Thermo-time switch,                 | Connecting leads 4/1, 46 and ground connection. |
| 3. Electric fuel pump,                 | Connecting leads 48/1 and ground lead.          |



## TEST VALUES

### Pressure Regulator

- Fuel pressure 2.3...2.7 bar

### Electric Fuel Pump

- Fuel delivery (measured in return line): at least 700 cm<sup>3</sup>/30s
- Terminal voltage (under load): at least 12 V

### Thermo-Time Switch (35°/8 sec):

● Electric Internal resistance at	Between term. "G" + ground	Between term. "W" + ground	Between term. "G" + "W"
Ambient temperature (below +30°C)	25...40 Ω	0Ω	25...40 Ω
Engine at normal op. temp. (above +40°C)	50...80 Ω	100...160Ω	50...80 Ω

### Solenoid-Operated Cold-Start Valve

- Electric internal resistance 3.5...4.5 Ω
- Leaks: maximum permissible 1 drop/min.

### Auxiliary-Air Device.

- Electric internal resistance: 30...65 Ω



## Test Values (Continuation)

### Temperature Sensor

- Electric internal resistance

	NTC I	NTC II
Ambient temperature (+15°C...+30°C):	1.45...3.3 k $\Omega$	1.30...3.6 k $\Omega$
Engine at operating temp. (approx. +80°C):	280...360 $\Omega$	250...390 $\Omega$

### Solenoid-Operated Cold-Start Valve (at +20°C)

- Electric internal resistance: 2.0...3.0  $\Omega$

### Charge-air Pressure Switch

- Resistance

at atmospheric pressure:	$\infty$ $\Omega$
at 1.1...1.2 bar gauge pressure	0 $\Omega$

### Air-Flow Sensor

- Resistance between

term. 7 and term. 8: (Open sensor flap all the way)	200...1000 $\Omega$
---	---------------------

### Pressure Sensor (Altitude sensor)

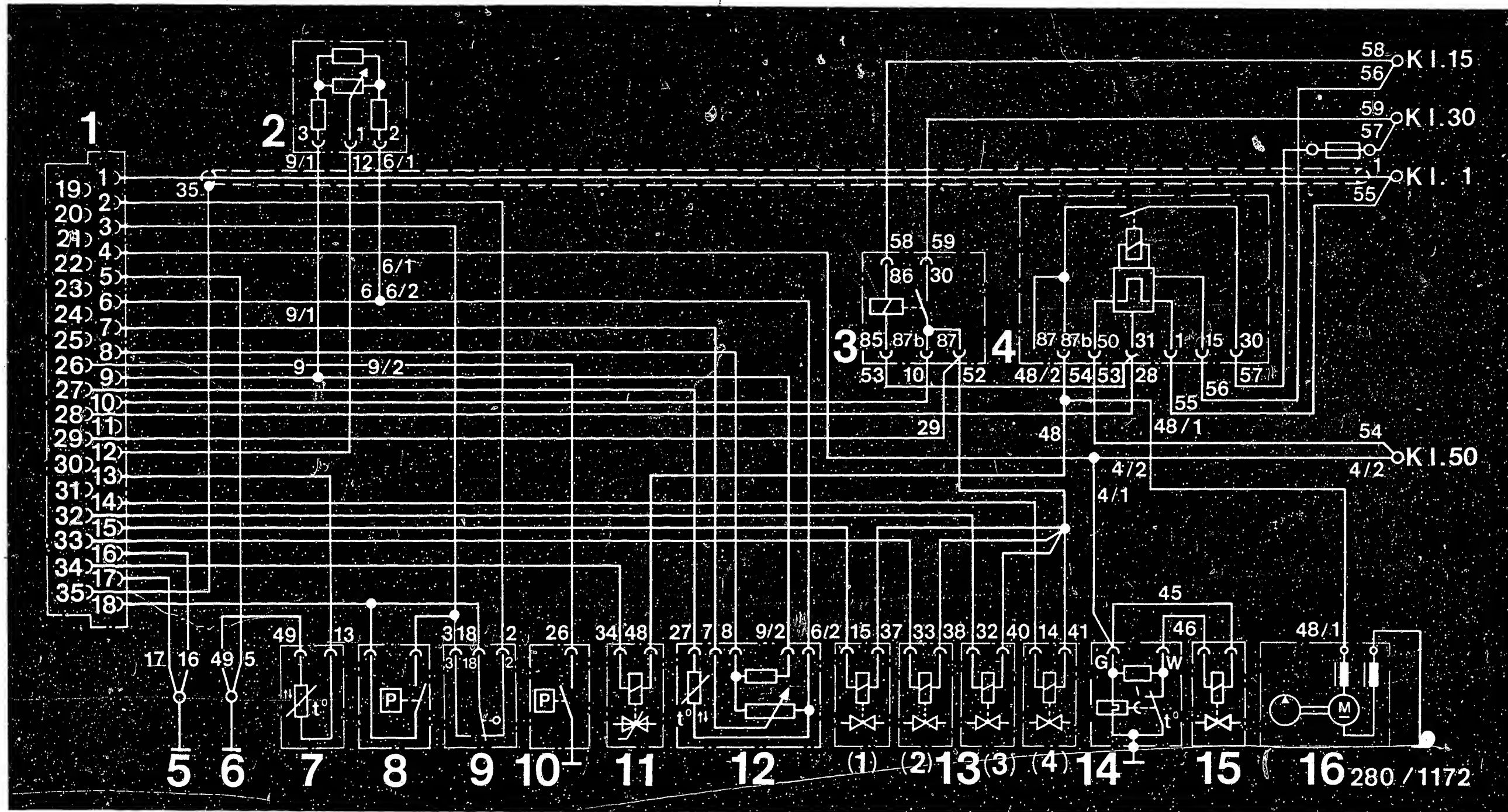
300 m alt. (977 mbar):	2.0... 4.0 V
4000 m alt. (616 mbar):	8.0...12.0 V
Resistance between term. 2 (-) and term. 3 (+):	2.3...2.8 k $\Omega$

### Idle Adjustment (engine at operating temp., approx. +80°C)

- Idle engine speed: 700...800 min<sup>-1</sup>
- CO concentration: 0.5...0.7 vol. %

For adjustment values for ignition, valve play, and other engine data, see equipment and autodata microcards.





ELECTRICAL CONNECTION DIAGRAM

- |                                       |                                    |                                 |   |
|---------------------------------------|------------------------------------|---------------------------------|---|
| 1 = Control unit plug                 | 5 = Final stage ground terminal    | 9 = Throttle-valve switch       | 13 = Solenoid-operated injection valves |
| 2 = Pressure sensor (altitude sensor) | 6 = Electronics ground terminal    | 10 = Charge-air pressure switch | 14 = Thermo-time switch                 |
| 3 = Main relay                        | 7 = Temperature sensor II (engine) | 11 = Auxiliary-air device       | 15 = Solenoid-operated start valve      |
| 4 = Control relay                     | 8 = Full-load pressure switch      | 12 = Air-flow sensor            | 16 = Electric fuel pump                 |

**C13**

Electrical Connection Diagram  
Renault

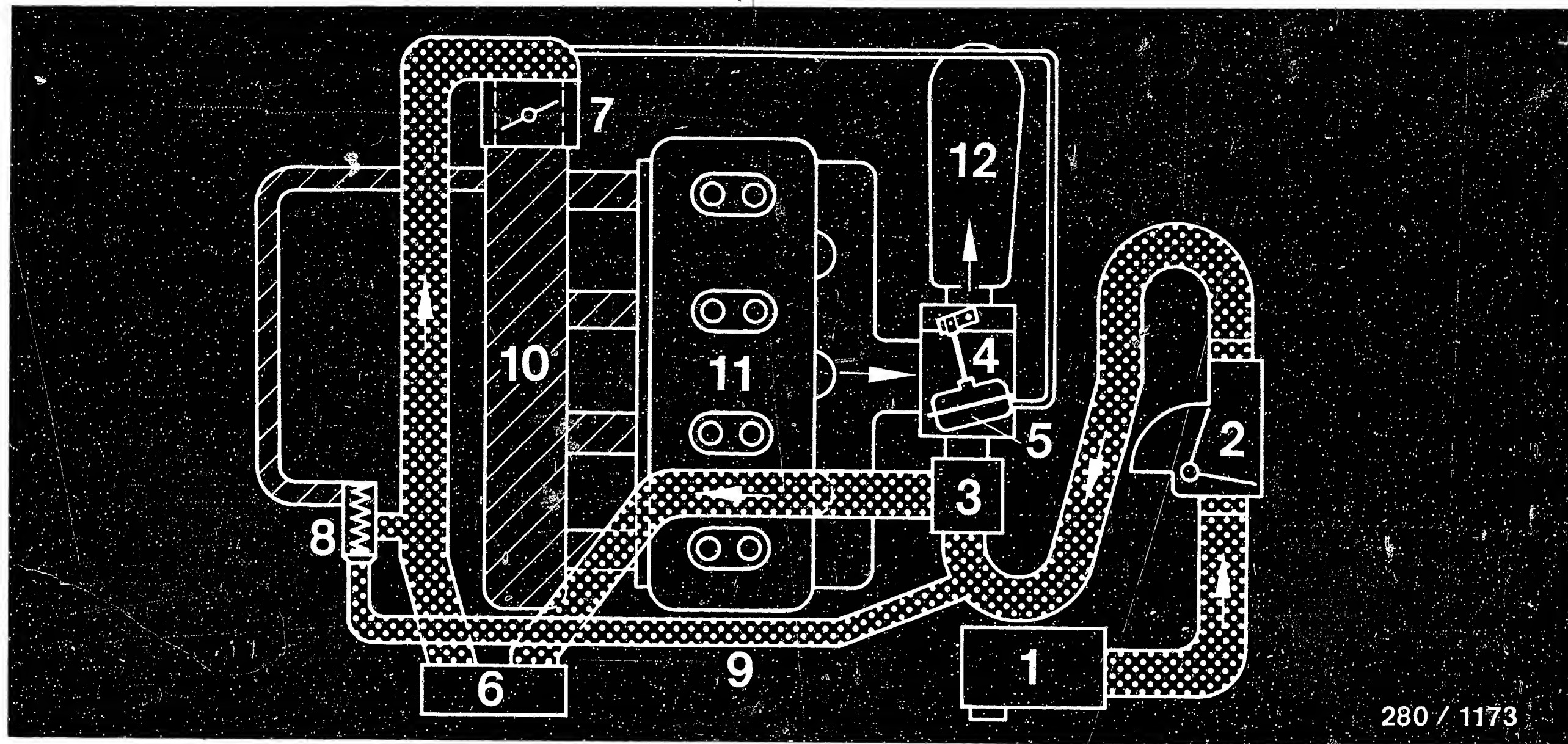


**C14**

Electrical Connection Diagram  
Renault









280 / 1173

Air Flow Diagram

- 1 = Air filter
- 2 = Air-flow sensor
- 3 = Exhaust turbocharger (intake-air side)
- 4 = Exhaust turbocharger (exhaust side)
- 5 = Wastegate
- 6 = Charge-air cooler

- 7 = Throttle plate
- 8 = Bypass-air valve
- 9 = Bypass circuit
- 10 = Intake manifold
- 11 = Cylinder block
- 12 = Exhaust

-  Intake air
-  Intake manifold pressure

**C15**

Air Flow Diagram  
Renault



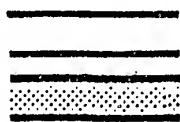
**C16**

Air Flow Diagram  
Renault





### Fuel Line Diagram



Pressureless

Fuel pressure

1 = Delivery  
line

2 = Fuel-distribution pipe

3 = Solenoid-operated  
injection valves

4 = Cold-start valve

5 = Intake manifold  
pressure connection

6 = Pressure regulator

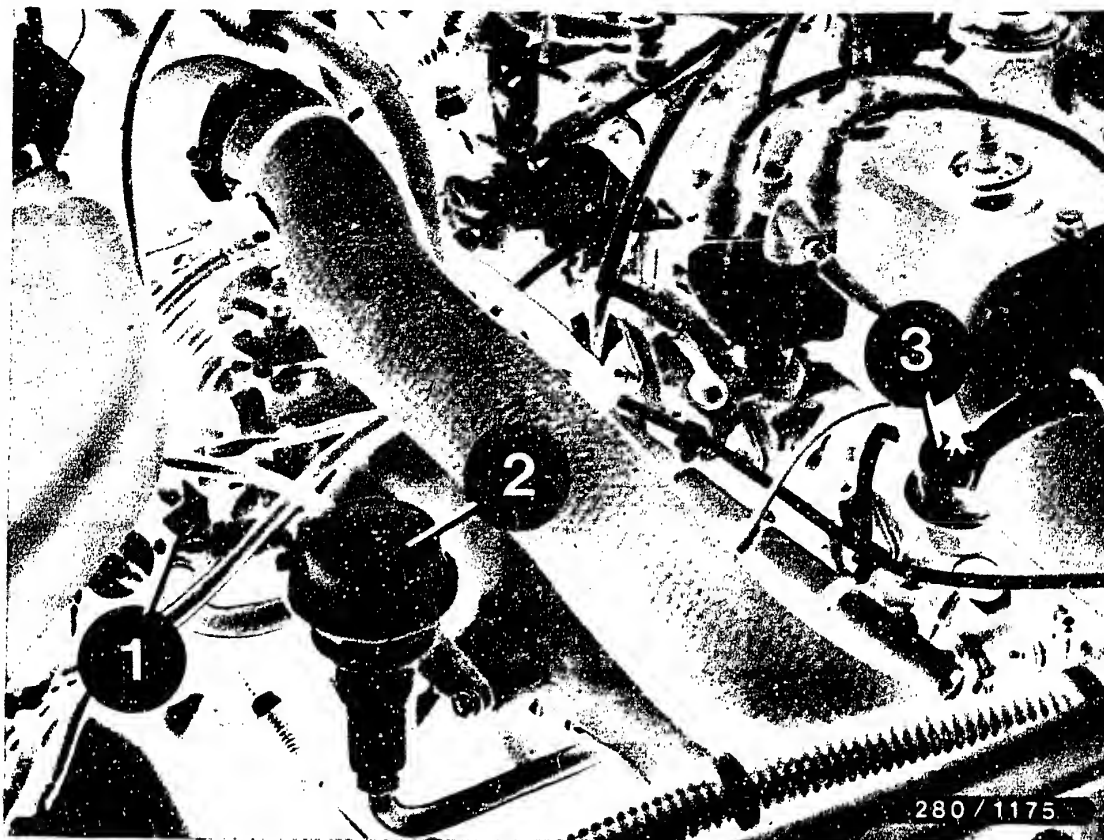
7 = Return line

8 = Fuel tank

9 = Electric fuel pump

10 = Fuel filter





- 1 = Solenoid-operated cold-start valve
- 2 = Exhaust-gas-recirculation valve
- 3 = Pressure regulator

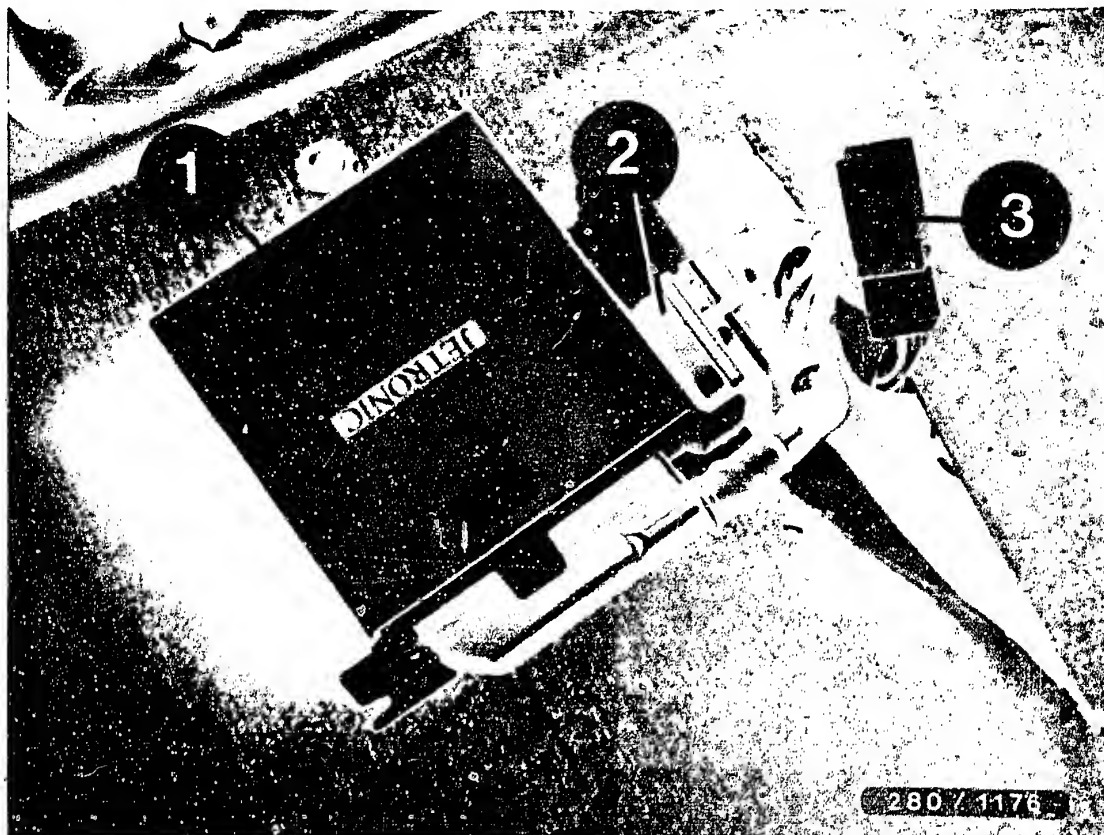
### CHECKING FUEL PRESSURE

Unscrew hose from solenoid-operated cold-start valve.  
Connect pressure tester KDJE-P 100 to hose.

Make sure there is no leakage at connections.

Do not damage cold-start valve when screwing fuel  
pressure hose on and off.





- 1 = Control unit
- 2 = Pressure sensor (altitude sensor)
- 3 = Control relay

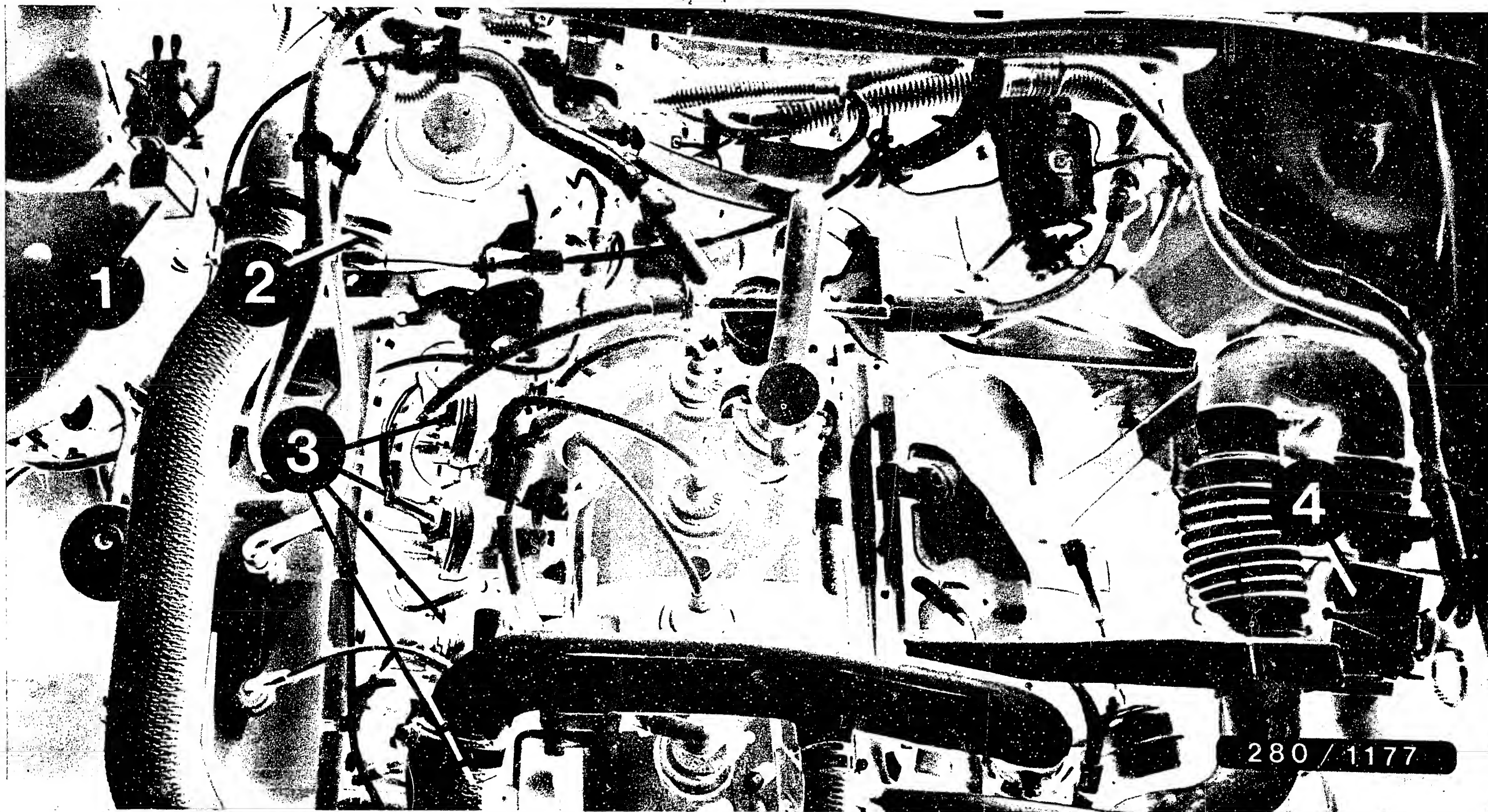
### Installed Position of Components

The control unit, pressure sensor, and control relay are located under the carpeting in the floor of the passenger-side footwell.

To detach the 35-pin Jetronec plug, push detent towards the rear.

Hinge up plug in direction of arrow.





1 = Main relay

2 = Throttle-valve assembly

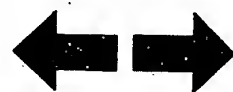
3 = Solenoid-operated injection valves

4 = Air-flow sensor

● Position of Components on Engine

**C20**

Installed Position of Components  
Renault



**C21**

Installed Position of Components  
Renault





- 1 = Final stage ground
- 2 = Electronics ground
- 3 = Temperature sensor



## Installed Position of Components (Continued)

- Electric fuel pump: Underneath vehicle, to the right, forward of rear axle.
- Fuel filter: Underneath vehicle, to the right, forward of rear axle.
- Solenoid-operated cold-start valve: On intake manifold, to the right
- Thermo-time switch: On engine block, to the right to the rear.
- Temperature sensor: On engine block, to the right to the rear.
- Throttle-valve switch: Below on throttle-valve assembly.
- Auxiliary-air device: Between second and third solenoid-operated injection valves.
- Full-load pressure switch: Center right in engine compartment, forward of engine firewall.
- Charge-air pressure switch: Center left in engine compartment, forward of engine firewall.



# T A B L E   O F   C O N T E N T S

## Section

## Coordinates

Special features/rapid diagnosis chart.....D	2
Test specifications.....D	11
Electrical terminal diagram until 7.85.....D	13
Electrical terminal diagram from 8.85.....D	15
Installation position of components.....D	17





### Special features

- For Saab 9000 Turbo, (3.85 → )
- Fuel filter located in engine compartment.
- Exhaust-gas recirculation.
- Turbo-charging with charge-air cooling.
- Knock control (Saab APC system).
- Mechanical throttle-valve damper. The damper causes a mechanical braking of throttle-valve movement during closing.
- Fuel switch-off when starting.  
When starting motor is operated, fuel supply is cut off when accelerator pedal is pressed to full-throttle position.
- In-tank pump with additional in-tank pre-supply pump
- Elimination of starting information at control unit plug term. 4
- Control unit 0 280 000 519 is installed until 7.85. From 8.85 control unit 0 280 000 534 is used, with idle-speed control instead of auxiliary-air device.
- Cold-start difficulties up to chassis no. AF400 2051:
- Install control unit 0 280 000 519 with green dot.
- From 8.86 with control unit 0 280 000 540 or 0 280 000 548.

### Remark:

Basic microcard for detailed trouble-shooting: SAA-501.  
Important: When referring to a basic microcard, it is important to note that the test specifications must always be derived from the vehicle-specific brief instructions.

### Rapid diagnosis chart for universal test adapter

The following rapid diagnosis chart makes it possible for the experienced L-Jetronic specialist to rapidly check the electrical parts of the system using the universal test adapter.

The rapid diagnosis chart contains the following information:

- Test step sequence
- Position of V- and  $\Omega$ - program switches
- Remarks on operation of the universal test adapter or other components
- Test specifications for motortester and multimeter





# Rapid diagnosis chart for universal test adapter

Test step	Switch position		Measurement	Remarks Connect adapter lead only to peripherals	Test specifications (reading)
	V	$\Omega$			
1	↓	5	Resistance value of temperature sensor NTC 11 (engine temperature). At control unit plug between term. 2 and term. 11	---	(+15°C...+30°C): 1450...3300 $\Omega$ (+80°C): 280... $\Omega$
2	↓	6	Resistance of ground terminal output stage. At control unit plug between term. 25 and term. 11.	---	0 ... 10 $\Omega$
3	↓	7	Resistance of ground terminal for sensors. At control unit plug between term. 5 and term. 11	---	0 ... 10 $\Omega$
4		8	Resistance of all 4 parallel-connected solenoid-operated injection valves, and in series with them, the auxiliary-air device. At control unit plug between term. 13 and term. 11 until 7.85	1. Unplug connector from auxiliary-air device and insert a short-circuit bridge into the plug. 2. Remove short-circuit bridge and reconnect connector to auxiliary-air device.	Until 7.85 1. (+15°...+30°C): 6.8...9.3 $\Omega$ (+80°C): 7.0...9.8 $\Omega$ 2. Reading should increase by approx. 50 $\Omega$
			From 8.85 auxiliary-air device no longer present. Connect positive end test connection to ground.	After testing, bridge <u>must</u> be removed.	From 8.85: (+15°C...+30°C): 6.8...9.3 $\Omega$ (+80°C): 7.0...9.8 $\Omega$
5	↓	9	Resistance of idle contact in throttle-valve switch. At control unit plug between term. 3 and term. 11.	1. Accelerator pedal in rest position 2. Depress accelerator pedal half way 3. Release accelerator pedal	1. 0 ... 10 $\Omega$ 2. $\infty\Omega$ 3. After approx. 3...6 s 0 ... 10 $\Omega$
6	↓	10	Resistance of full-load contact in throttle-valve switch. At control unit plug between term. 12 and term. 11.	Fully depress accelerator pedal	0 ... 10 $\Omega$
7	↓	10	From 8.85 idle-speed regulator test pin (1-pin plug in test connection). Resistance at control unit plug term. 12 and term. 11.	Connect test pin to ground. Bridge <u>must</u> be removed after testing.	0 ... 10 $\Omega$
8	↓	11	Resistance of idle actuator (1 winding) at control unit plug between term. 10 and term. 11.	In test connection connect positive to ground. Bridge <u>must</u> be removed after testing.	(+15°C...+30°C): 20 ... 32 $\Omega$ (+80°C): 24.5... 37.0 $\Omega$

**D3**

Rapid diagnosis chart

Saab



**D4**

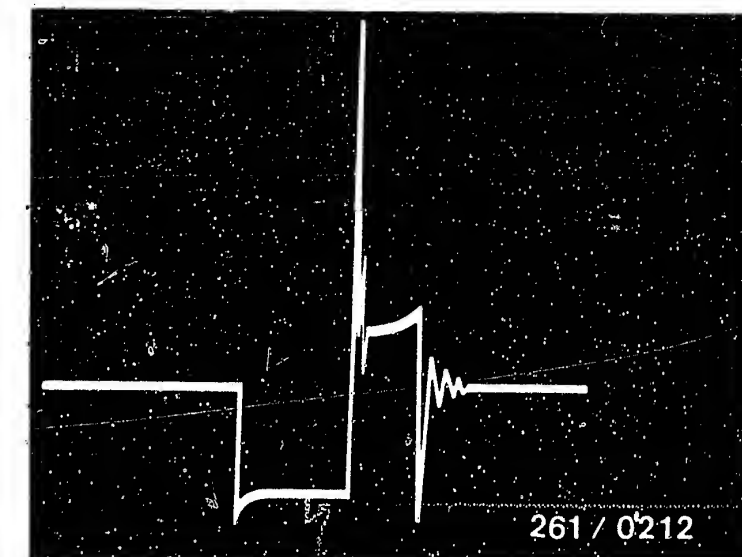
Rapid diagnosis chart

Saab



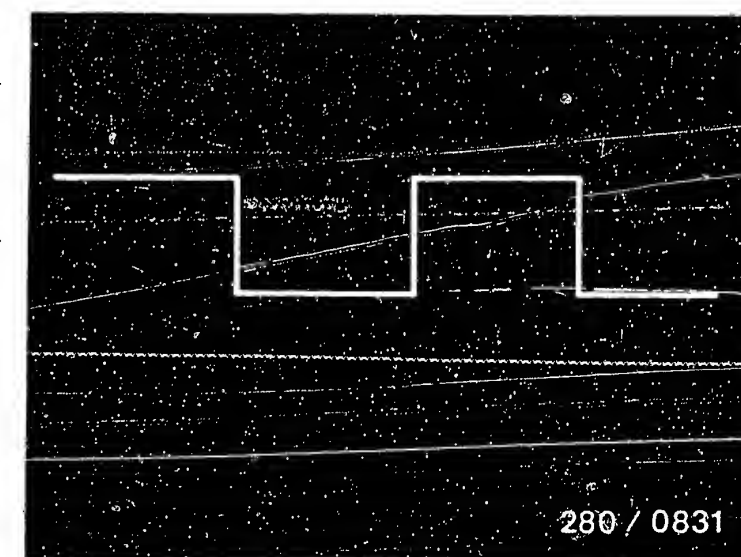
# Rapid diagnosis chart for universal test adapter

Test step	Switch position		Measurement	Remarks Connect adapter lead only to peripherals	Test specifications (reading)
	V	Ω			
9	↓	12	From 8.85, resistance of idle actuator (2nd winding) at control unit plug between term. 23 and term. 11. In test connection connect positive to ground. After testing, bridge <u>must</u> be removed.		(+15°C...+30°C): 18...29.5 Ω (+80°C): 22...34 Ω
10	↓	21	Potentiometer for idle-mixture adjustment. Resistance at control unit plug term. 14 and term. 6.	Dependent on C0 setting	150...600 Ω
11	5	21	Voltage pulse. At control unit plug between term. 1 and term. 11.	Ignition "ON". Measure primary signal / t <sub>D</sub> signal with oscilloscope. Disengage gear and start.	Until 7.85 term. 1 see upper illustration 8.85 term. t <sub>D</sub> see lower illustration
12	6	21	Press key 4. Voltage from main relay term. 87. At control unit plug between term. 9 and term. 11	Ignition "ON".	8 ... 15 V
13	7	21	Voltage from ignition coil term. 15. At control unit plug term. 18 and term. 11	Ignition "ON".	8 ... 15 V
14	8	21	Voltage at main relay term. 85. At control unit plug between term. 21 and term. 11.	Ignition "ON".	8 ... 15 V
15	9	21	Press key 4½. Voltage at pump relay term. 85. At control unit plug between term. 17 and term. 11.	Ignition "ON".	8 ... 15 V



Primary signal from term. 1.

t<sub>D</sub> signal, from 8.85 model



D5

Rapid diagnosis chart

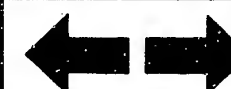
Saab



D6

Rapid diagnosis chart

Saab



# Rapid diagnosis chart for universal test adapter

Test step	Switch position		Measurement	Remarks	Test specifications (reading)
	V	Ω			
Connect adapter lead to peripherals and control unit (ignition "OFF"). Then let engine warm up (operating temperature).					
16	10	21	Voltage at a/c switch (if present and if time-lag relay is installed). At control unit plug between term. 16 and term. 11	Ignition "ON". Let engine run. Switch on air conditioner (after approx. 1 sec test specification)	8 ... 15 V
17	3	21	Output voltage of hot-wire air-mass sensor. At control unit plug between term. 7 and term. 6	When engine speed changes, output voltage should also change.	2 ... 5 V
18	11	21	From 8.85, basic idle setting	Allow engine to run at operating temperature. Read engine speed from motortester, if necessary adjust. Electric loads switched off. Connect test pin to ground	775...925 min <sup>-1</sup>  750 min <sup>-1</sup>
19	11	21	From 8.85 take on-off ratio from idle actuator.	Measurement with dwell-angle tester at sockets 1 and 2 (1) Connect test pin to ground. (2) Test pin away from ground, idle speed. (3) Switch on air conditioner (where present) (4) Apply throttle, engine speed above 3000 min <sup>-1</sup> . On-off ratio <u>must</u> increase.	(1) 29.9 % (2) approx. 32 % (3) <u>must increase by approx. 7 %</u> (4) <u>greater than 36 %</u>

**D7**

Rapid diagnosis chart

Saab



**D8**

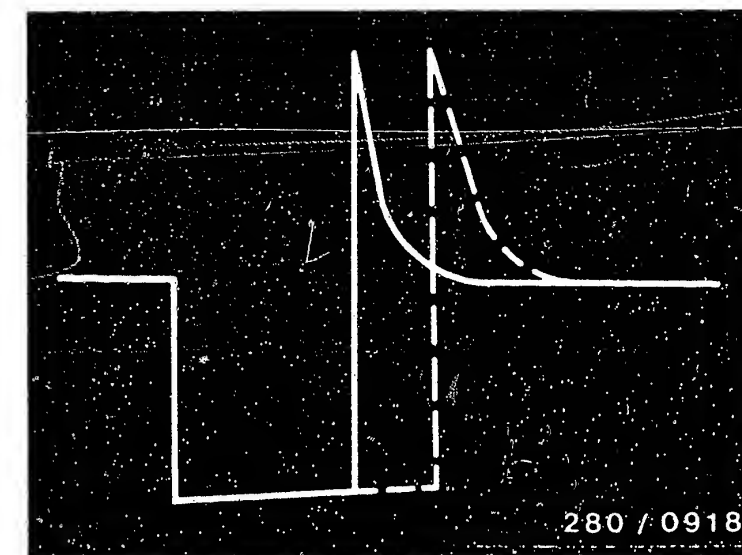
Rapid diagnosis chart

Saab



# Rapid diagnosis chart for universal test adapter

Test step	Switch position		Measurement	Remarks	Test specifications (remarks)
	V	Ω			
Control unit operation test (engine at operating temperature).					
20	12	21	Test injection signal ( $t_i$ ) from control unit with oscilloscope. At control unit plug term. 13 and term. 11	---	
21	12	21	Press key 1. Warm-up	As for test step 15, except after pressing key (NTC II cold) injection time must increase somewhat in length / engine speed increases, CO value rises.	see
22	12	21	Press key 2. Warm-up (regulated) one-time short engine speed rise possible, but after that constant speed.	As test step 15, except after pressing key (NTC II warm) injection time must remain constant.	picture above
23	12	21	Press key 6. Full-load enrichment.	When key 6 is pressed either the injection time must become longer or engine speed must increase and CO value rise.	
24	13	21	Self-cleaning. At control unit plug between term. 8 and term. 11.	Before this test, engine speed must be above 2000 min <sup>-1</sup> and engine temperature at least + 60°C. Then ignition "OFF". → Voltage reading after approx. 4 s:	2 ... 5 V (reading duration approx. 1 s)



**D9**

Rapid diagnosis chart

Saab



**D10**

Rapid diagnosis chart

Saab



## TEST SPECIFICATIONS

Pressure regulator 0 280 160 225, 0 280 160 227

- Fuel pressure 2.3 ... 2.7 bar

Pressure regulator 0 280 160 264, 0 280 160 265

- Fuel pressure 2.6 ... 3.0 bar

### Electric fuel pump

- Delivery quantity (measured in return): min. 900 cm<sup>3</sup>/30 s
- Terminal voltage (under load): min. 12 V

### Temperature sensor II (engine) (blue)

- Electrical internal resistance at  
Ambient temperature  
(+15° ... + 30°C): 1450 ... 3330 Ω  
Engine at operating temp.  
(approx. +80°C): 280 ... 360 Ω

### Solenoid-operated injection valve (at +20°C)

- Electrical internal resistance: 14.5 ... 17.0 Ω

### Hot-wire air-mass sensor

- Electrical internal resistance  
between term. 6 and term. 3: 0 ... 1100 Ω  
between term. 5 and term. 3: 3.6 ... 4.1 Ω



### Idle actuator from 8.85

- electrical internal resistance at (+15°C...+30°C):

between term. 2 and term. 3	17 ... 22.5 $\Omega$
between term. 2 and term. 1	19 ... 22.0 $\Omega$

### Auxiliary-air device, not applicable from 8.85

- electrical internal resistance

Manual transmission:	40 ... 75 $\Omega$
Automatic transmission:	30 ... 65 $\Omega$

### Idle adjustment

(engine at operating temperature, approx. +80°C)

Manual and automatic transmission

- |                                  |                               |
|----------------------------------|-------------------------------|
| (lower beams switched on):       | 775 ... 925 min <sup>-1</sup> |
| On-off ratio should show approx. | 32 %                          |
| Test pin to ground               | 725 ... 775 min <sup>-1</sup> |
| On-off ratio should show approx. | 29.9 %                        |

### CO setting

At idle speed:	0.9...1.6 vol. %CO
----------------	--------------------

At simulated full-load enrichment

(bridge term. 3 and term. 18 at  
throttle-valve-switch plug)

4.0...6.0 vol. %CO
--------------------

Start control with NTC II connector unplugged and NTC  
II 0 280 130 028 plugged

- Connection voltage at an injection valve:  
falls within approx. 15 sec starting time from  
initial voltage greater than 2.5 V to approx. 0.3 V.  
Engine must not start up. Observe safety  
precautions.

### Exhaust turbo-supercharger

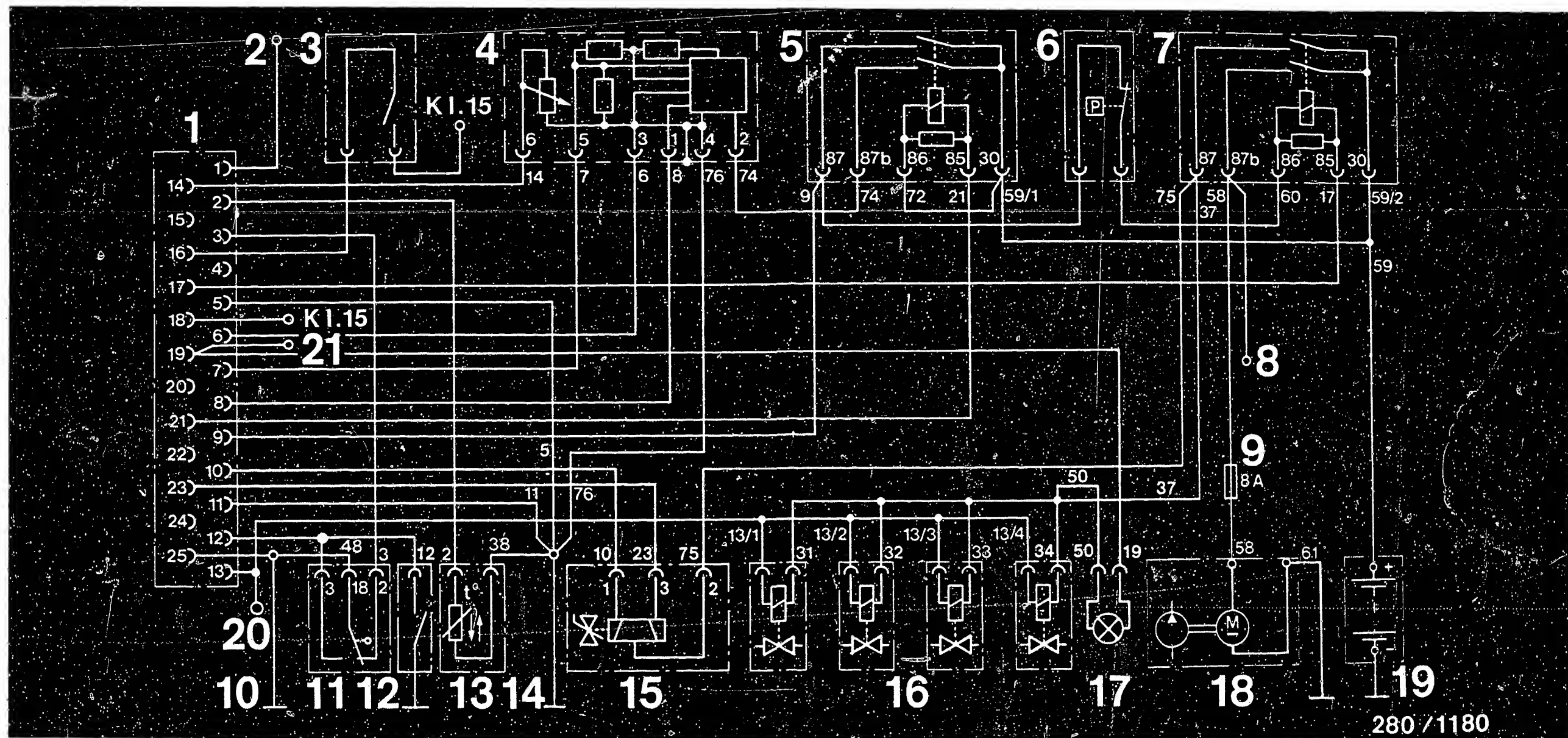
Max. charge-air pressure	0.8 ... 0.9 bar
Basic charge-air pressure	0.37...0.43 bar
Pressure-sensing switch (switch pressure)	1.05...1.15 bar

For adjustment values for ignition, valve play, and  
other technical engine data, see equipment and  
Autodata microcard.









# **ELECTRICAL TERMINAL DIAGRAM from 8.85**

- |   |   |   |  |
|---|---|---|--|
| 1 = Control unit plug   | 6 = Pressure-sensing switch                       | 11 = Throttle-valve switch              | 17 = Limp-home display (2 W bulb)                    |
| 2 = $t_D$ release via ignition trigger box term. 7 and ignition booster relay | 7 = Pump relay                                    | 12 = Test pin (low-idle-speed control)  | 18 = Electric fuel pump and parallel pre-supply pump |
| 3 = A/C switch (where present)  | 8 = Sensor monitoring (not connected on EU model) | 13 = Temperature sensor II              | 19 = Battery   |
| 4 = Hot-wire air-mass sensor  | 9 = Pump fuse                                     | 14 = Sensor ground terminal             | 20 = To on-board computer                            |
| 5 = Main relay  | 10 = Output stage ground terminal                 | 15 = Idle actuator                      | 21 = Test connection                                 |
|   |   | 16 = Solenoid-operated injection valves |  |

**D 15**

Electrical terminal diagram

Saab



**D 16**

Electrical terminal diagram

Saab





## Installation position of components

Installation information is always with respect to direction of travel.

- LH Jetronic control unit (1) (upper illustration)

The control unit is located in the engine compartment on the left underneath a cover under the intermediate panel below the left windshield-wiper axle.

To connect to the universal test adapter, loosen control unit fastening bolts and unplug control unit plug. To do this, press detent (blocking lug) up.

- Fuel-pump fuse no. 14 (middle illustration)

- Safety circuit (switch on electric fuel pump for measurements) (middle illustration)

To do this, open glove compartment and remove cover over fuse box. Pull out fuses no. 14 and no. 22 and plug in auxiliary lead (1) with 8 ampere fuse element.

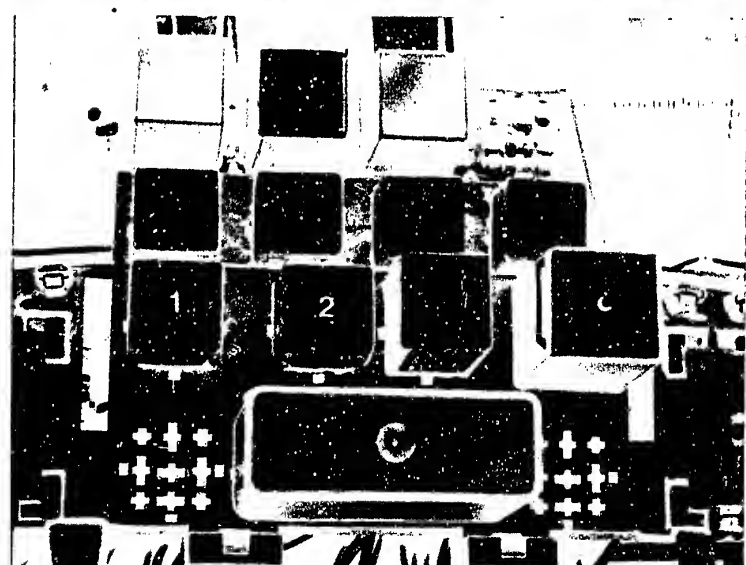
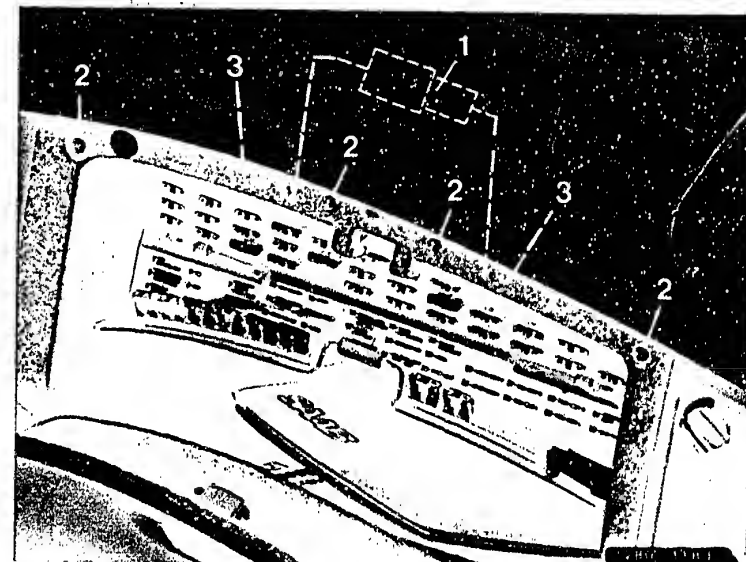
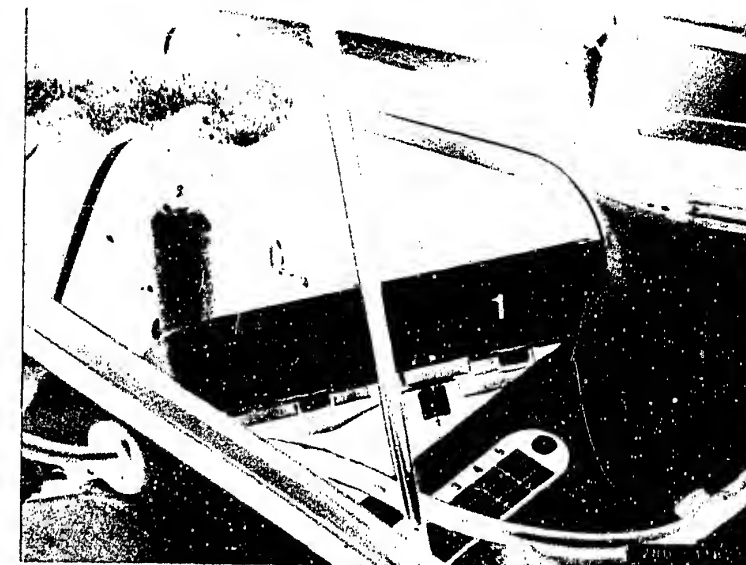
- Main and pump relay (lower illustration)

- Remove glove compartment. To do this, unscrew screws (2) (middle illustration).

- Remove fuse element. To do this, unscrew screw (3) (middle illustration).

(1) Main relay, lower illustration

(2) Pump relay, lower illustration



**D17**

Installation position of components

Saab

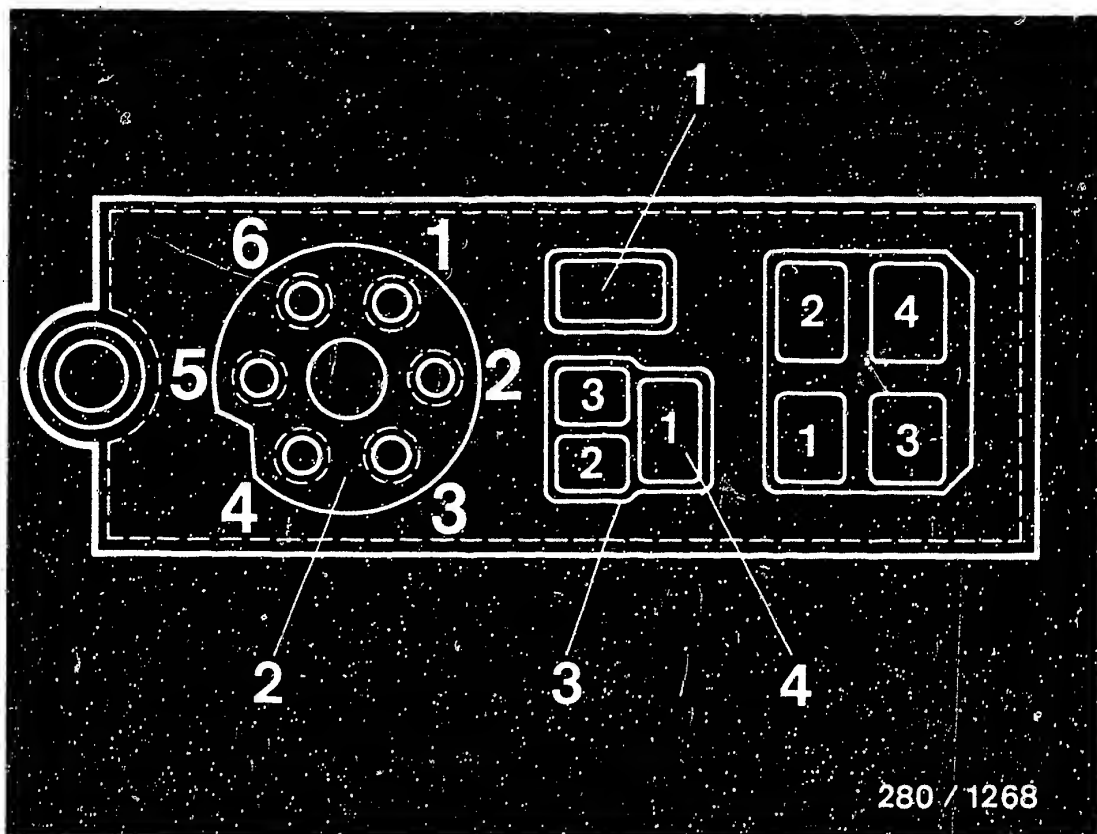


**D18**

Installation position of components

Saab





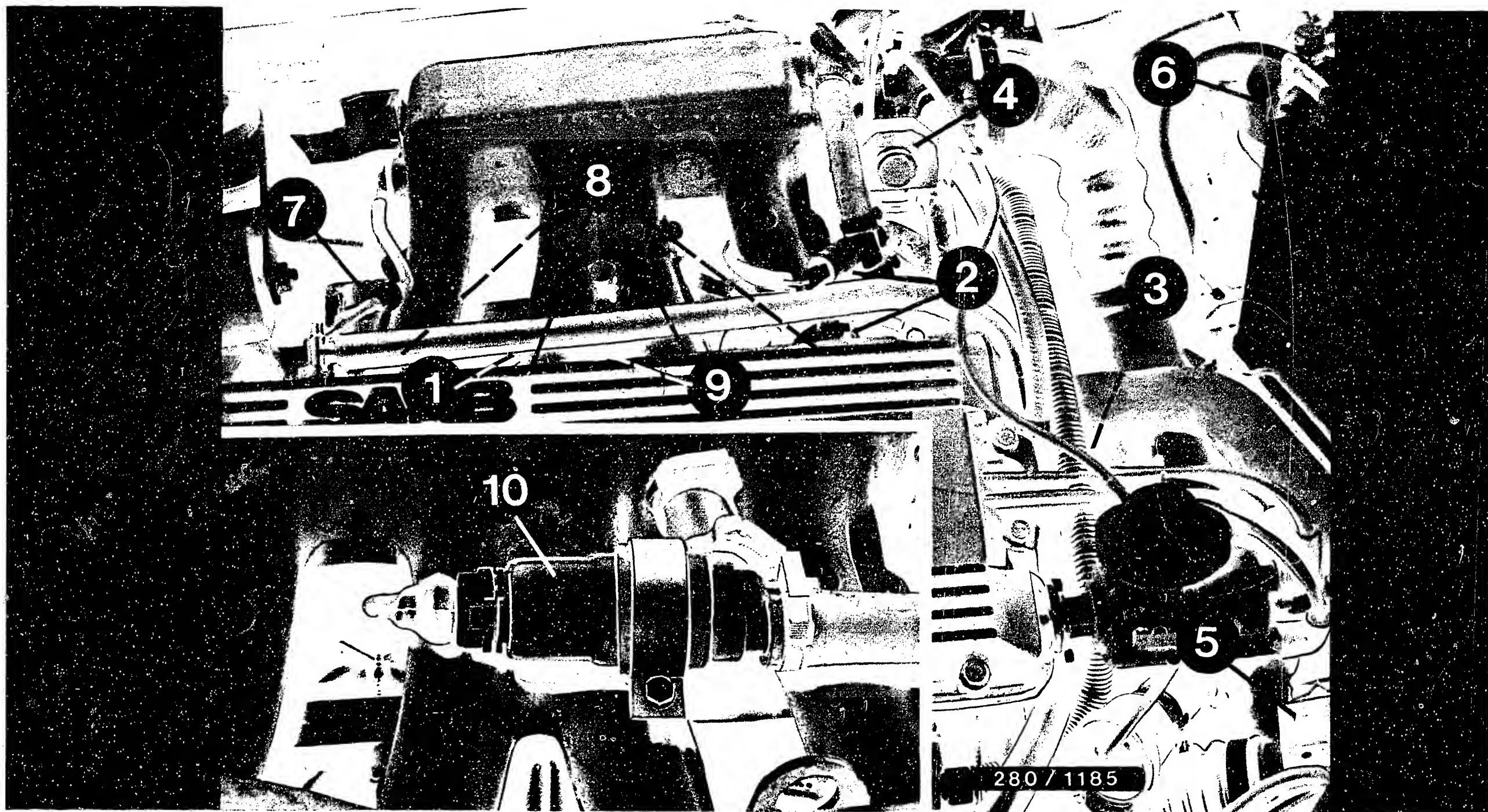
- 1 = Idle-speed-control test
- 2 = TSI socket
- 3 = Test plug for LH-Jetronic
- 4 = Positive connection

### Test connection

### Installation position of components (continued)

The connection points for ignition-timing monitoring (TSI socket), as well as for the LH system, are located in a common test connection, which is found on the left side in the engine compartment behind the engine bulkhead.





Installation position of components (continued)

1 = Temperature sensor II  
(engine), blue plug  
2 = Ground terminals

3 = Auxiliary-air device, not  
applicable from 6.85  
4 = Throttle-valve switch

5 = Hot-wire air-mass sensor  
6 = Fuel filter  
7 = Pressure regulator

8 = Solenoid-operated injection  
valve  
9 = Knock sensor  
10 = Idle actuator from 8.85

**D20**

Installation position of components  
Saab



**D21**

Installation position of components  
Saab



# Installation position of components (continued)

## ● Upper illustration

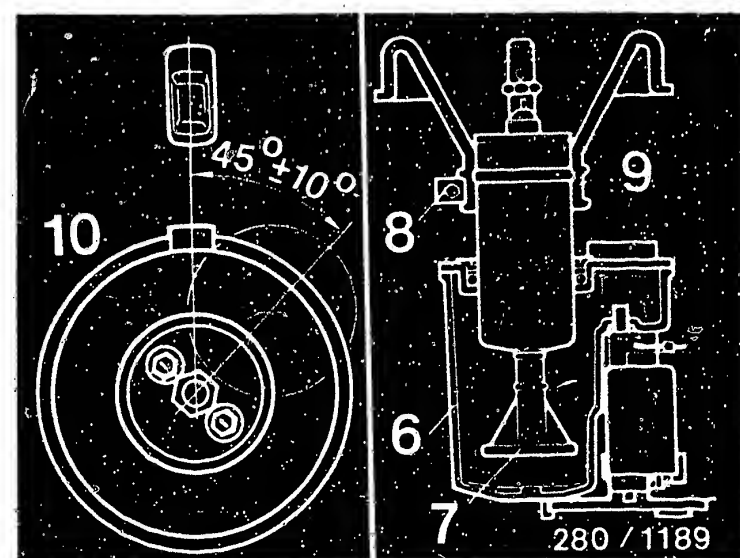
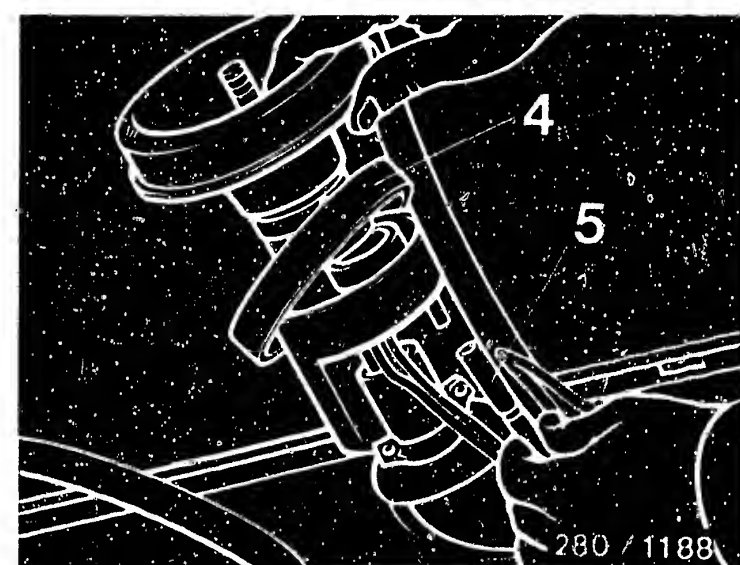
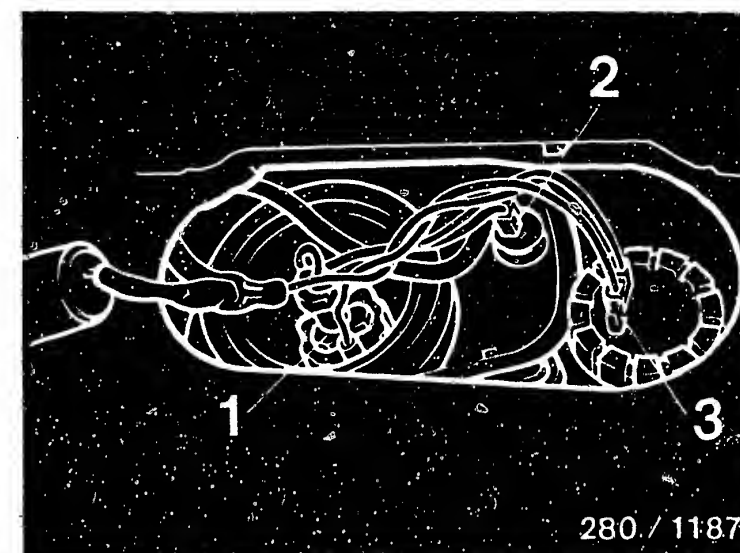
- 1 = Electric fuel pump
- 2 = Pre-supply pump electrical connection
- 3 = Fuel-level sensor electrical connection

## ● Removal of electric fuel pump

- Disconnect battery
- Pull up rear section of luggage-compartment floor, remove both fastening screws, and lift out floor.
- Turn the two bayonet holders securing the cover over the electric fuel pump, lift cover, and push back slightly.
- Disconnect electrical connections on electric fuel pump, pre-supply pump, and fuel-level sensor.
- Pinch off fuel-pressure line with hose clamp.
- Unscrew reducer bushing on electric fuel pump pressure line and pull off ring connection with fuel-pressure line.
- Caution! fuel can run out. Observe safety precautions,.
- Remove clamp (8) on electric fuel pump sealing collar (9).
- Pull up electric fuel pump including reservoir, pull off fuel-return hose from reservoir, loosen pre-supply pump lead at tank lead-through.
- Pull electric fuel pump out of reservoir (6) and remove strainer (7).
- Unscrew clamp (8) on sealing collar (9) and pull electric fuel pump out of collar.

## ● Installation

- Position sealing collar so that its edge is 50 mm above the upper edge of the fuel pump.
- Attach strainer (7), insert electric fuel pump into reservoir (6), and insert new o-ring.
- Install electric fuel pump in such a manner that the fuel-reservoir pressure-relief valve is offset to the sealing collar mark by  $45^\circ \pm 10^\circ$  (10).
- Adjust the overall height of the electric fuel pump to 250 mm.
- Continue by proceeding in the opposite order of removal.



## Installation position of components (continued)

- Knock control (APC system)
  - Switchgear: underneath dashboard, on the left near steering column (behind knee guard).
  - Knock sensor: on engine, underneath intake manifold
  - Solenoid-operated valve: on fan hood, before coolant filter
  - Pressure sensor: see switchgear
  - Vacuum-operated switch: see switchgear
- Ground points for injection system
  - In engine compartment to the left on intake manifold, near throttle-valve switch.
  - Ground point for electric fuel pump and pre-supply pump underneath left part of rear seat.
- Pressure-sensing switch: underneath dashboard, on the left next to steering column (behind knee guard); switches off electric fuel pump when charge-air pressure exceeds 1.05 bar.
- Low-idle-speed control (from 8.85)
  - Idle actuator replaces auxiliary-air device
  - Test pin: near control unit, 1-pin plug connection (in test connection).
- From 8.85 test connection (on the left next to LH control unit on chassis), diagnosis socket for test pin, integrater voltage (US version) and TSI socket.
- From 8.85 climate control
  - Despite built-in air conditioning, control unit input term. 16 receives no voltage signal, since in individual vehicles no time-lag relay is installed.



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Fuel pressure test .....	E 20
Installation position of components .....	E 21





### SPECIAL FEATURES

This microcard contains the LH-Jetronic trouble-shooting instructions for the following model valid at the time of printing:

- SAAB 900i (8.1985 →)

- Europe/USA version with catalytic converter
- 2.0l/4-cyl. engine (16 valves), 89 kW (122 HP/DIN)
- O-ring connection of solenoid-operated injection valves
- Mechanical throttle-valve damper.

The damper causes a mechanical braking of the movement of the throttle valve when closing.

### Remark

- Similar SIS repair instructions:  
SIS microcard SAA-501

### RAPID DIAGNOSIS CHART FOR UNIVERSAL TEST ADAPTER

The following rapid diagnosis chart makes it possible for the experienced L-Jetronic expert to quickly check the electrical part of the system with the universal test adapter.

### The rapid diagnosis chart contains the following information:

- Switch positions on universal test adapter
- Sequence of test steps
- Notes on how to operate the universal test adapter or other components
- Readings on multimeter/motortester



# RAPID DIAGNOSIS CHART FOR UNIVERSAL TEST ADAPTER

Test step	Switch position		Measurement	Remarks Connect adapter lead to peripherals only	Test specifications (reading)
	V	$\Omega$			
1	↓	5	Resistance of temperature sensor NTC II (engine temperature). On control-unit plug between term. 2 and term. 11.	----	(+15°C...+30°C): 1450...3300 $\Omega$ (+80°C): 280...360 $\Omega$
2	↓	6	Resistance of output stage ground terminal. On control-unit plug between term. 25 and term. 11.	----	0 ... 10 $\Omega$
3	↓	7	Resistance of sensors ground terminal. On control-unit plug between term. 5 and term. 11.	----	0 ... 10 $\Omega$
4	↓	8	Resistance of all 4 parallel-connected solenoid-operated injection valves. On control-unit plug between term. 13 and term. 11.	Disconnect plug from sensor heating and jump. Remove jumper after testing.	(+15°C...+30°C): 6.80...10.5 $\Omega$ (+80°C): 7.00...12.00 $\Omega$
5	↓	9	Resistance of idle contact in throttle-valve switch. On control-unit plug between term. 3 and term. 11.	1. Accelerator in rest position 2. Accelerator semi-depressed 3. Release accelerator	1. 0...10 $\Omega$ 2. $\infty$ $\Omega$ 3. after approx. 3...6s: 0...10 $\Omega$
6	↓	10	Resistance of full-load contact in throttle-valve switch. On control-unit plug between term. 12 and term. 11	Accelerator fully depressed	0 ... 10 $\Omega$
7	↓	10	Idle-speed control test pin (1-pin plug) (right). Resistance on control-unit plug between term. 12 and term. 11.	Connect test pin to ground.	0 ... 10 $\Omega$
8	↓	11	Resistance of idle actuator (1st winding) and of electric fuel pump on control-unit plug between term. 10 and term. 11. Disconnect sensor heating plug and connect jumper. After testing, remove short-circuit jumper and connect sensor heating.		(+15°C...+30°C): 20...32 $\Omega$ (+80°C): 24.5...37.0 $\Omega$

E3

Rapid diagnosis chart

Saab 900i



E4

Rapid diagnosis chart

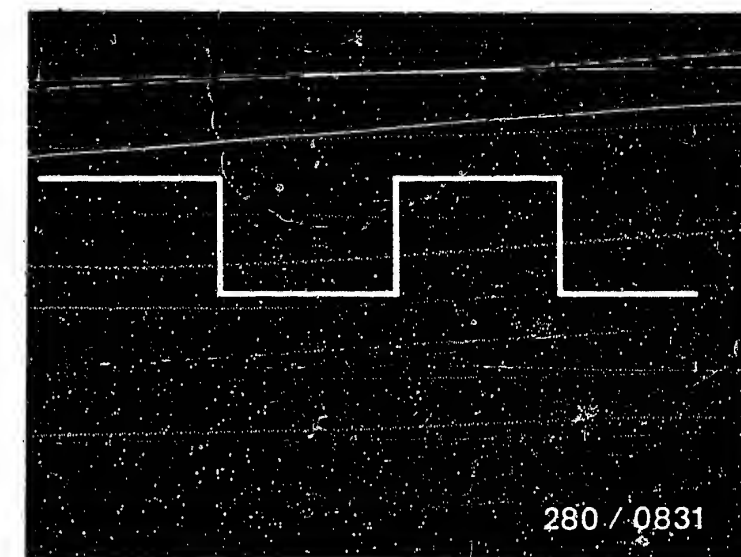
Saab 900i





# Rapid diagnosis chart for universal test adapter (continued)

Test step	Switch position		Measurement	Remarks (connect adapter lead to peripherals only)	Test specifications (reading)
	V	$\Omega$			
9	↓	12	Resistance of idle actuator (2nd winding) and of electric fuel pump on control-unit plug between term. 23 and term. 11. Disconnect sensor heating plug and connect jumper. After testing, remove short-circuit jumper and connect sensor heating.		(+15°C...+30°C): 18...29.5 $\Omega$ (+80°C): 22...34 $\Omega$
10	↓	21	Potentiometer for idle mixture adjustment. Resistance at control-unit plug term. 14 and term. 6.	Dependent on CO adjustment	150...600 $\Omega$
11	5	21	Voltage pulses. On control-unit plug between term. 1 and term. 11.	Ignition "ON". Measure $t_D$ signal with oscilloscope. Shift gear to neutral and start.	$t_D$ signal
12	6	21	Press button 4. Voltage from main relay term. 87. On control-unit plug between term. 9 and term. 11.	Ignition "ON"	8 ... 15 V
13	7	21	Voltage from ignition coil term. 15. On control-unit plug between term. 18 and term. 11.	Ignition "ON"	8 ... 15 V
14	8	21	Voltage at main relay term. 85. On control-unit plug between term. 21 and term. 11.	Ignition "ON"	8 ... 15 V
15	9	21	Press button 4. Voltage at pump relay term. 85. On control-unit plug between term. 17 and term. 11.	Ignition "ON"	8 ... 15 V



$t_D$  signal

**E5**

Rapid diagnosis chart  
Saab 900i



**E6**

Rapid diagnosis chart  
Saab 900i

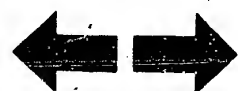


# Rapid diagnosis chart for universal test adapter (continued)

Test step	Switch position		Button	Measurement	Remarks	Test specifications (reading)
	V	$\Omega$				
				Connect adapter lead to peripherals <u>and</u> control unit (ignition OFF). Then warm up engine (normal operating temperature).		
16	10	21	-	Voltage at air-conditioning switch (if applicable and if time-delay relay is installed). On control-unit plug between term. 16 and term. 11	Ignition "ON". Let engine run. Switch on air conditioner (make reading after approx. 1 sec.).	<u>8 ... 15 V</u>
17	3	21	-	Output voltage of hot-wire air-mass sensor between term. 3 and term. 2. On control-unit plug between term. 7 and term. 6	Change in engine speed must result in change in output voltage	<u>2 ... 5 V</u>
Lambda closed-loop control functional test						
18	11	21	-	Lambda closed-loop control open-loop value. On control-unit plug between term. 22 and term. 11	$\Omega$ switch positions 22, 23 and 24 not allowed.	<u>10 ... 13 V</u>
19	11	22	-	Lambda closed-loop control rich value. On control-unit plug between term. 22 and term. 11	----	<u>10 ... 13 V</u>
20	11	23	-	Lambda closed-loop control lean value. On control-unit plug between term. 22 and term. 11	Reading obtained after approx. 5 sec.	<u>less than 0.5 V</u>
21	11	24	-	Lambda closed-loop control closed-loop value. On control-unit plug between term. 22 and term. 11	Perform measurement at approx. 2500 min <sup>-1</sup> .	<u>0 ... 13 V</u> (alternating between low and high values)
22	11	24	-	Basic idle adjustment Apply test pin to ground (right) Remove jumper after testing.	Let warmed-up engine run. Read off speed on motortester, and adjust if necessary. Electrical devices off.	<u>775...925 min<sup>-1</sup></u>

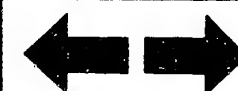
**E7**

Rapid diagnosis chart  
Saab 900i



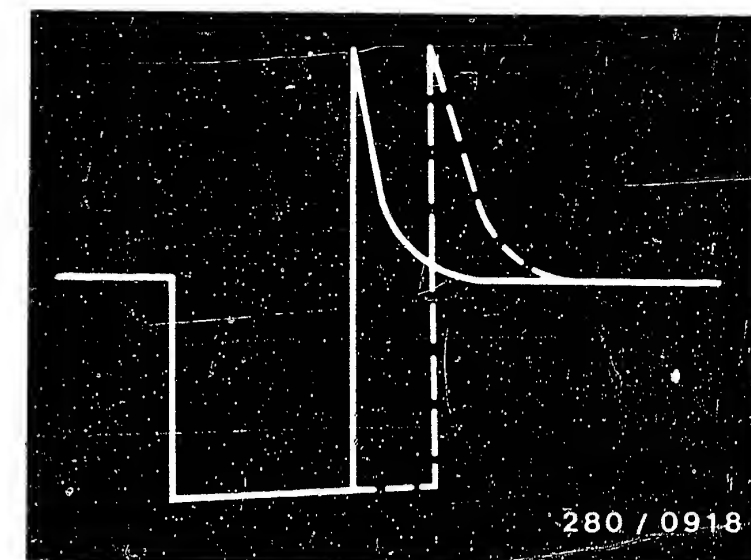
**E8**

Rapid diagnosis chart  
Saab 900i



# Rapid diagnosis chart for universal test adapter (continued)

Test step	Switch position		Button	Measurement	Remarks	Test specifications
	V	$\Omega$				(reading)
23	11	24	-	Record on/off ratio at idle actuator.	Measurement with dwell-angle tester at sockets 1 and 2 (1) Apply test pin to ground (2) Test pin away from ground (3) Idle speed and (4) also switch on air conditioner (if applicable) (5) Accelerate, engine speed above 3000 min <sup>-1</sup> . On/off ratio must rise.	(1) 29.9 % (2) 31...33% (3) 34.0...36.5% (4) Must rise by approx. 5% (5) greater than 36%
24	12	24	-	Functional test of control unit (engine at normal operating temperature). Test injection signal ti from control unit with oscilloscope. On control-unit plug between term. 13 and term. 11	Let warmed-up engine run.	See top graph
25	12	24	1	As 24, but after pressing button (NTC 11 - cold) duration of injection becomes slightly longer, and/or rise in engine speed CO value increases	Let warmed-up engine run.	Engine speed rises to approx. 2000 min <sup>-1</sup> and/or see top graph



**E9**

Rapid diagnosis chart  
Saab 900i



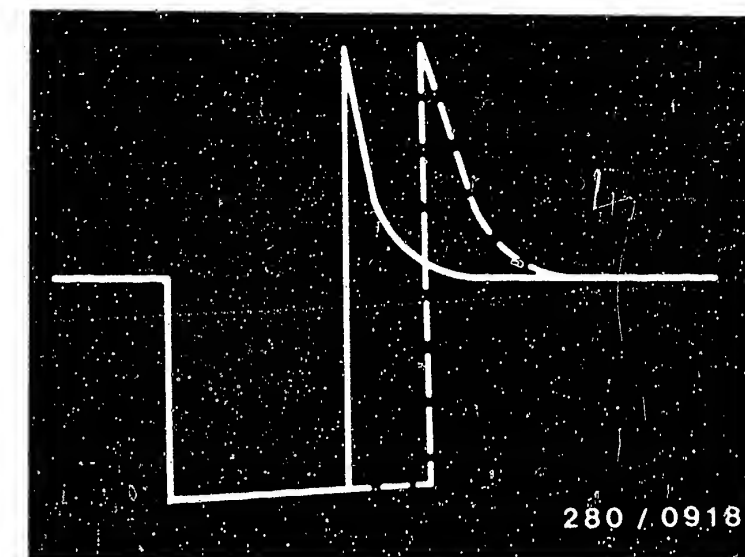
**E10**

Rapid diagnosis chart  
Saab 900i



# Rapid diagnosis chart for universal test adapter (continued)

Test step	Switch position		Button	Measurement	Remarks	Test specifications (reading)
	V	$\Omega$				
26	12	24	2	As 24, but after pressing button (NTC II - hot) duration of injection must remain constant.	Let warmed-up engine run.	see top graph
27	12	24	6	Functional test of control unit full-load enrichment. On control-unit plug between term. 13 and term. 11.	Let warmed-up engine run at idle. Injection signal must become wider and or the engine speed must rise when button 6 is pressed; CO value rises.	see top graph
28	13	24	-	Hot-wire air-mass sensor. Voltage measurement of self-cleaning function. On control-unit plug between term. 8 and term. 11.	Before this test, the engine must have operated at above 2000 min <sup>-1</sup> and the engine temperature must be greater than +60°C. Then ignition "OFF" - voltage reading after approx. 4 sec.	2 ... 5 V (Reading lasts approx. 1 sec)



**E11**

Rapid diagnosis chart  
Saab 900i



**E12**

Rapid diagnosis chart  
Saab 900i



## TEST SPECIFICATIONS

### Pressure regulator

- Fuel pressure 2.8 ... 3.2 bar

### Electric fuel pump

- Delivery (measured in return): min.: 700 cm<sup>3</sup>/30s
- Terminal voltage (under load): min. 12 V

### Lambda sensor heating

- Electrical internal resistance (PTC)

(with engine off): 1 ... 15 Ω

### Temperature sensor II (engine) (blue plug)

- electrical internal resistance at  
- ambient temperature  
(+15°C...+30°C):

1.45 ... 3.3 kΩ

- engine at op. temp. (approx. +80°C): 280 ... 360 Ω

### Solenoid-operated injection valve (at +15°C...+30°C)

- electrical internal resistance: 14.5 ... 17.0 Ω

### Hot-wire air-mass sensor

- Electrical internal resistance

between term. 6 and term. 2: 0 ... 1100 Ω

between term. 3 and term. 2: 3.6 ... 4.1 Ω



### Cold-start control

- Voltage measurement at a solenoid-operated injection valve while starting:  
Falling from approx. 2.5 V after approx. 10 sec, less than 1.0 V  
Engine must not start.
- Conditions for testing:
  - Remove pump fuse (pump must not run)
  - Connect spark gap to term. 4 (ignition coil) and ground
  - Disconnect NTC II and connect NTC 0 280 130 028 (at +15°C...+30°C) 10 kΩ.Connect voltmeter to solenoid-operated injection valve.

### Idle actuator

- Electrical internal resistance at (+15°C...+30°C)
  - between term. 2 and term. 3: 17...22.5 Ω
  - between term. 2 and term. 1: 19...25.0 Ω

### Idle adjustment, engine at normal operating temperature, approx. +80°C

Manual and automatic transmissions: 775...925 min<sup>-1</sup>  
On/off ratio between 31 ... 33%

### Integrator voltage adjustment (lambda closed-loop control)

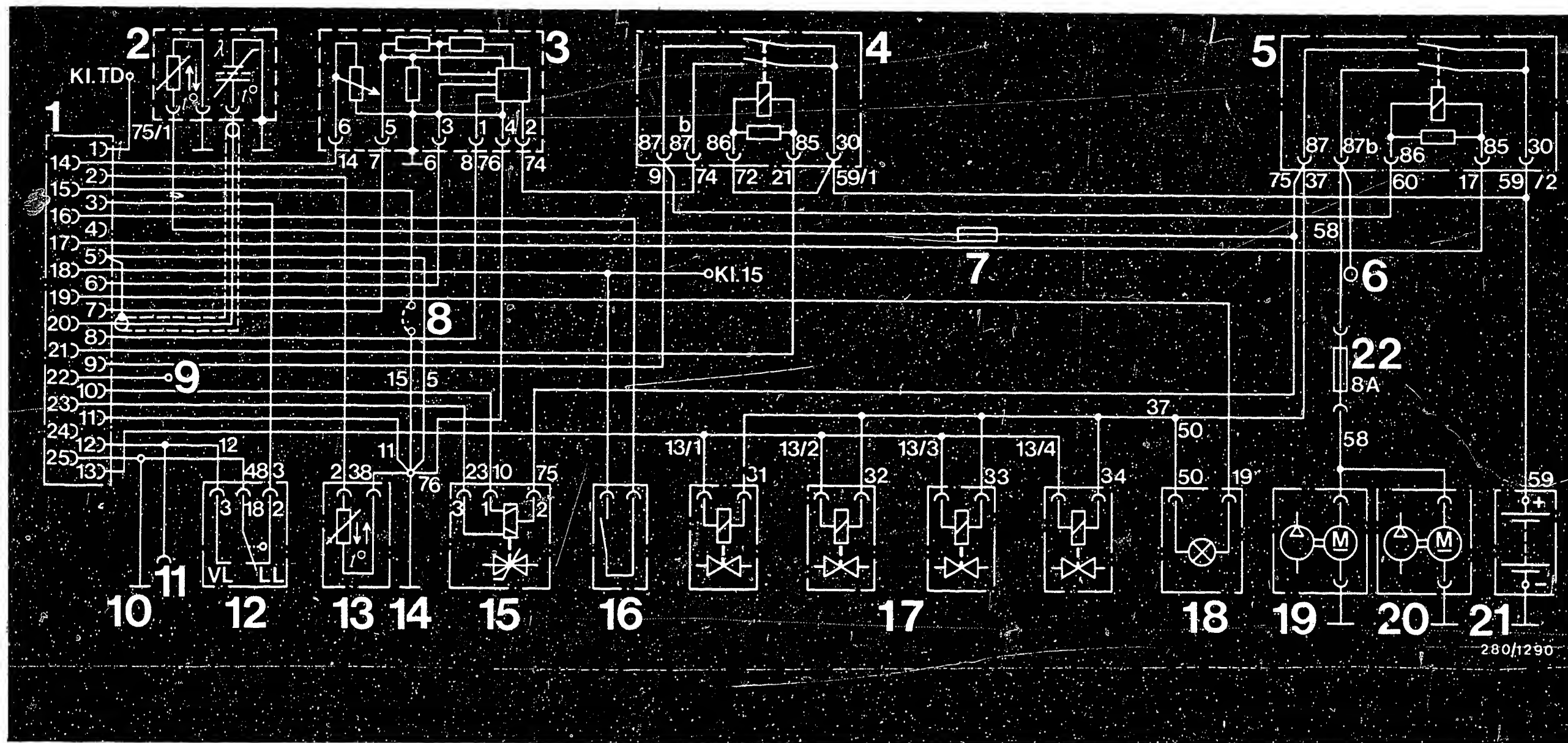
- Closed-loop mode (sensor connected): voltage reading fluctuates between 0 and 13 V
- Open-loop mode (sensor cable taken apart): 10 ... 13 V

Rich value (take apart sensor cable and apply control-unit end to ground): 10 ... 13 V

Lean value (apply 2 V to control-unit end of sensor cable): less than approx. 0.5V

Sensor must be hot; otherwise only open-loop mode.  
For settings for ignition, valve clearance and other engine data, see equipment and Autodata microcards.





# ELECTRICAL TERMINAL DIAGRAM

- |  |                                   |  |                                  |
|--|-----------------------------------|--|----------------------------------|
| 1 = Control-unit plug                              | 7 = Sensor fuse                   | 13= Temperature sensor II                    | 19= Electric fuel pump (in-tank) |
| 2 = Heated lambda sensor                           | 8 = Data encoding                 | 14= Sensor ground terminal                   | 20= Pre-supply pump (in-tank)    |
| 3 = Hot-wire air-mass sensor                       | 9 = Lambda integrator output      | 15= Idle actuator                            | 21= Battery                      |
| 4 = Main relay                                     | 10= Output stage ground terminal  | 16= Air conditioner switch                   | 22= Pump fuse                    |
| 5 = Pump relay                                     | 11= Test pin (idle-speed control) | 17= Injection valves                         |                                  |
| 6 = Sensor monitoring (not connected on EU models) | 12= Throttle-valve switch         | 18= Emergency-operation indicator (2 W bulb) |                                  |

E15

Electrical terminal diagram

Saab 900i



E16

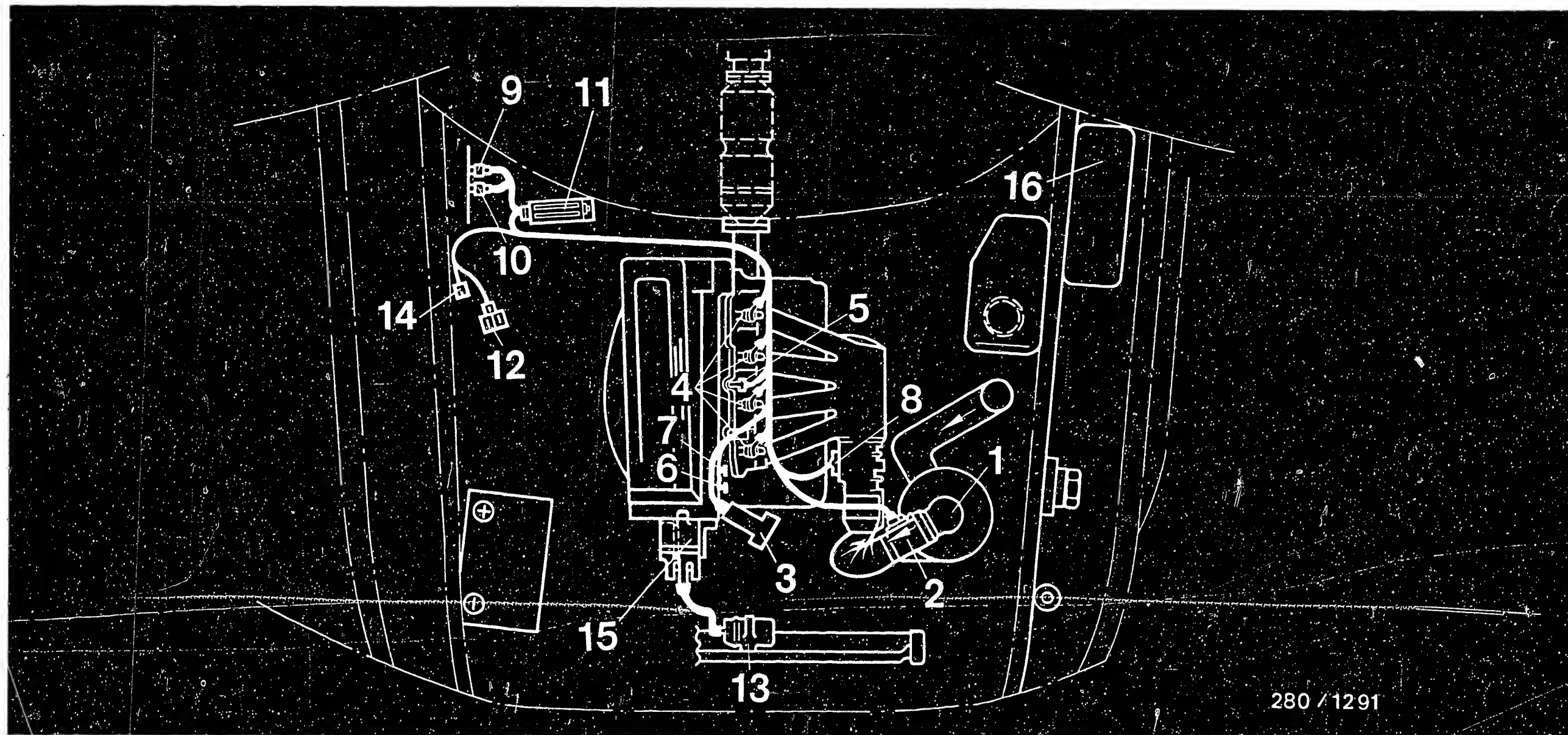
Electrical terminal diagram

Saab 900i



280/1290





280 / 1291

# ELECTRICAL WIRING DIAGRAM

- 1 = Air filter
- 2 = Hot-wire air-mass sensor
- 3 = Idle actuator
- 4 = Injection valves
- 5 = Temperature sensor II (engine)
- 6 = Sensors ground terminal

- 7 = Output stage ground terminal
- 8 = Throttle-valve switch
- 9 = Main relay
- 10 = Pump relay
- 11 = Control-unit plug

- 12 = Integrator output
- 13 = Ignition coil
- 14 = Test pin
- 15 = Ignition distributor
- 16 = Pump fuse

**E17**

Electrical wiring diagram  
Saab 900i



**E18**

Electrical wiring diagram  
Saab 900i





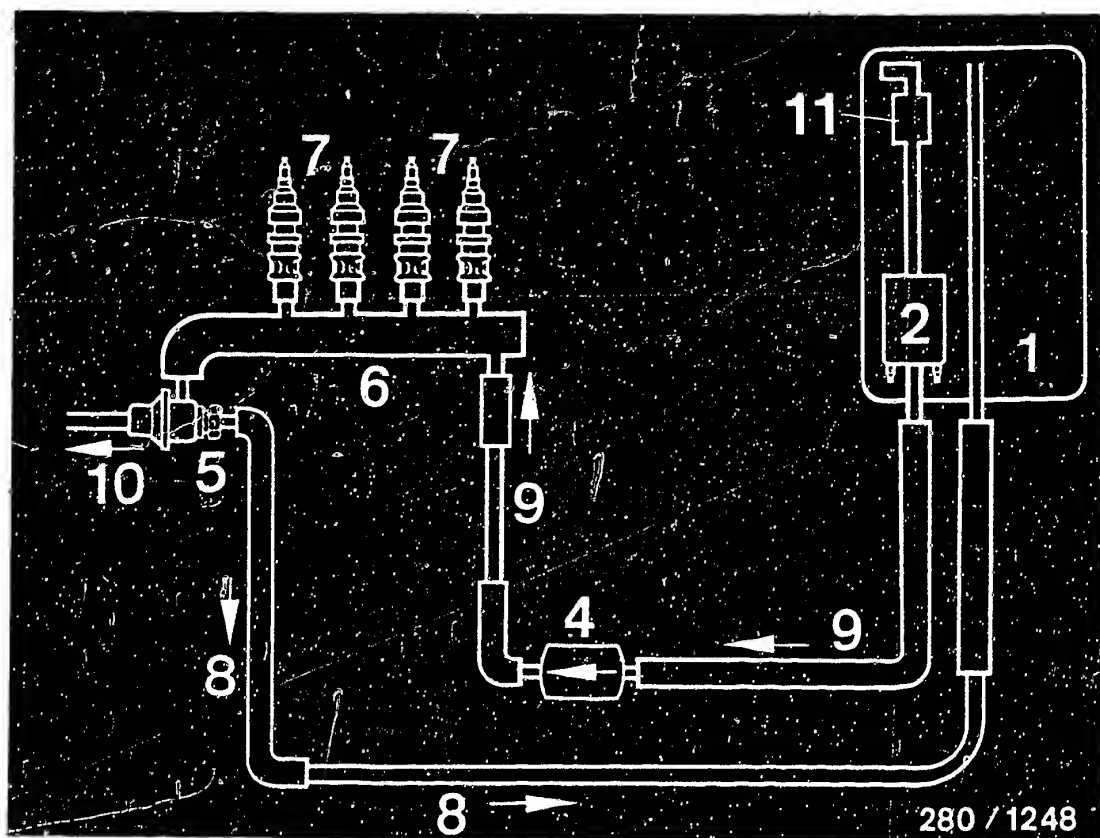
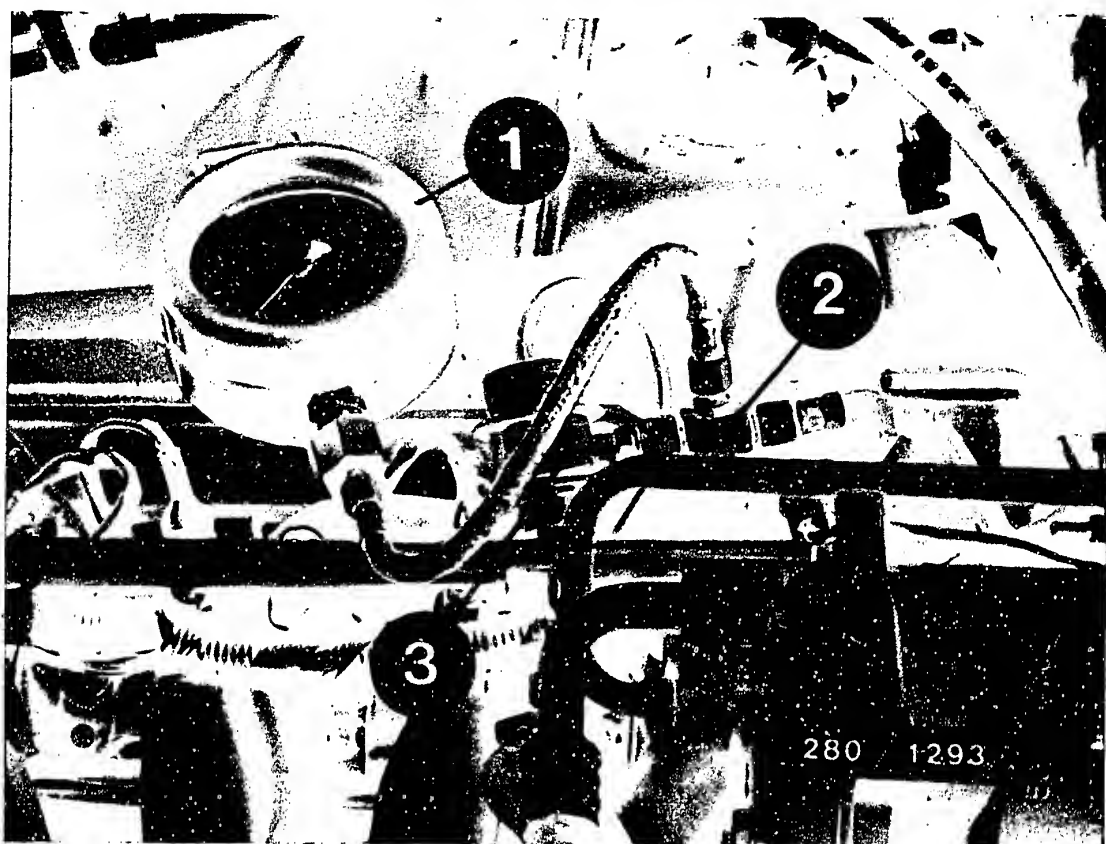


DIAGRAM OF FUEL LINES

- 1 = Fuel tank
- 2 = Electric fuel pump (in tank)
- 4 = Fuel filter
- 5 = Pressure regulator
- 6 = Fuel-distribution pipe
- 7 = Solenoid-operated injection valves
- 8 = Fuel return line
- 9 = Fuel delivery line
- 10 = To intake manifold
- 11 = In-tank pre-supply pump



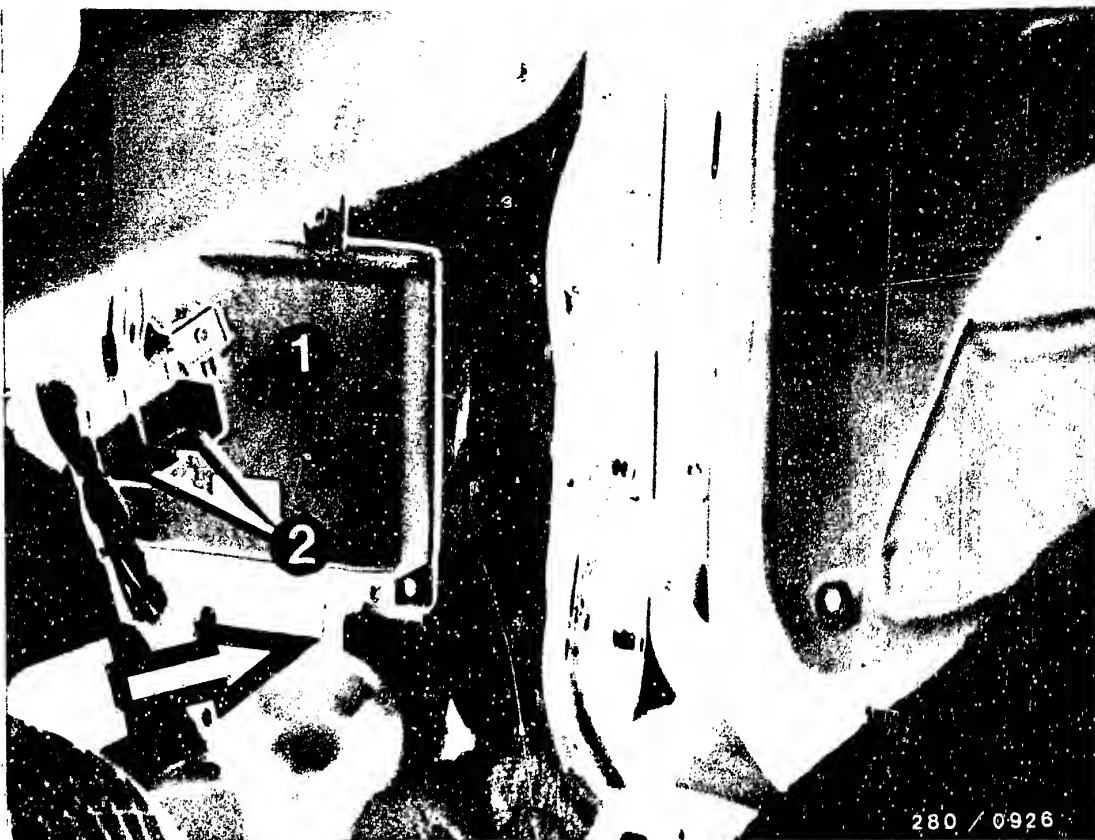


- 1 = Pressure gauge or pressure tester KDJE-P 100
- 2 = Connecting part KDJE-P 100/14
- 3 = Pressure regulator.

#### FUEL PRESSURE TEST

- Connect pressure gauge or pressure tester. Unscrew fuel delivery line from pressure regulator. Caution: when unscrewing the hose, make sure that no fuel gets onto hot parts of the engine.
- Connect connecting part KDJE-P 100/14 inbetween.
- If using pressure tester KDJE-P 100, close the valve screw; only the right-hand one in the case of KDEP 1034.

Make sure there are no leaks.



280 / 0926

1 = Control unit

2 = Main and pump relays

To connect the universal test adapter, disconnect control-unit plug (25-pin). To do this, push detent in direction of arrow.

### INSTALLATION POSITION OF COMPONENTS

The indications "right" and "left" refer always to the forward direction of travel.

#### Control unit:

The control unit is in the front-passenger footwell on the right behind the carpet.



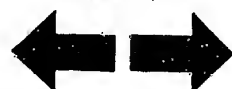


Installation position of components (continued)

- |   |                      |                               |
|---|----------------------|-------------------------------|
| 1 = Test pin                                      | 5 = Ground terminals | 9 = Throttle-valve switch     |
| 2 = Integrator connection                         | 6 = Injection valves | 10 = Hot-wire air-mass sensor |
| 2 = Pressure regulator                            | 7 = Knock sensor     |                               |
| 4 = Temperature sensor II (engine)<br>(blue plug) | 8 = Idle actuator    |                               |

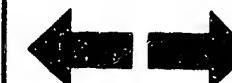
**E22**

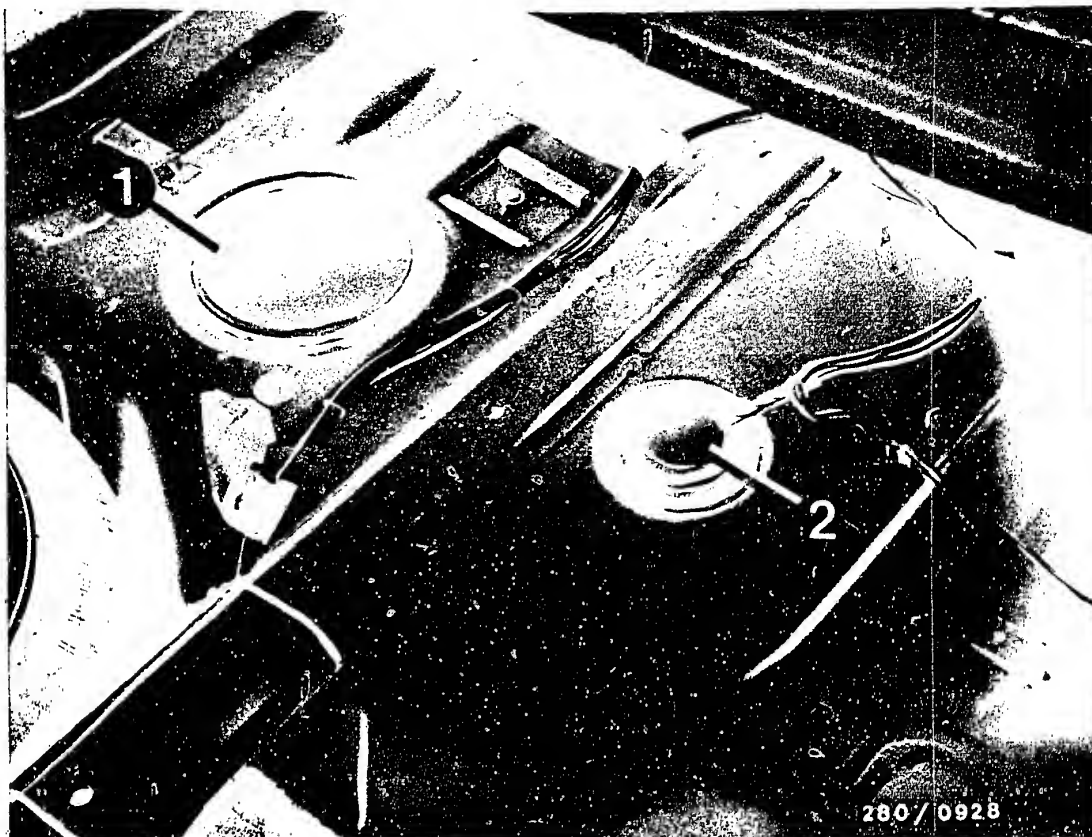
Installation position of components  
Saab 900i



**E23**

Installation position of components  
Saab 900i





Installation position of components (continued)

- 1 = In-tank electric fuel pump and in-tank pre-supply pump (under the cover)
- 2 = Tank sender

Fuel filter:

Under vehicle on right, near rear axle



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## SPECIAL FEATURES

This microcard contains the trouble-shooting instructions for the LH2-Jetronic, valid at the time of publication, for the following vehicles:

Volvo 760 GLE Turbo version (1.84→)  
with engine B 23 FT/B 230 FT

Detailed instructions: Volvo-505



## Special features

- Digital LH control unit
- Hot-wire air-mass sensor instead of an air-flow sensor.
- Idle actuator instead of an auxiliary-air device (low-idle-speed control)
- Relay set (main relay and pump relay) instead of two individual relays.
- Start control
- Heated lambda sensor as of 8.84 B 230 FT
- Pre-supply in-tank pump
- In some cases, idle contact also for EZK ignition control unit.

The vehicle is supplied only to the USA, has lambda closed-loop control with 3-bed catalytic converter, low-idle-speed control and turbo-charging with charge cooling.

The control unit and peripheral components are checked when testing using the universal test adapter and LH adapter lead.

From 1.84 up to 7.84 LH 2.1 with control unit

0 280 000 507

as of 8.84 LH 2.2 with control unit

0 280 000 518

Differences between the LH 2.1 and the 2.2 versions are only in the control unit.

## RAPID DIAGNOSTIC CHART FOR THE UNIVERSAL TEST ADAPTER

The rapid diagnostic chart below makes it possible for the experienced L-Jetronic expert to check quickly the electrical portion of the system using the universal test adapter.

The rapid diagnostic chart contains the following information:

- Sequence of test steps
- Setting of the V and  $\Omega$  program switches
- Notes on the operation of the universal test adapter or other components
- Test specifications for the motortester and multi-meter



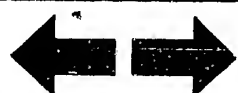


# Rapid diagnosis chart for universal test adapter

Test step	Switch position V	Measurement $\Omega$	Remarks Connect adapter lead only at peripheral components.	Test specifications (reading)
1	↓	5 Resistance of temperature sensor NTC II term. 2 (engine temperature). At control-unit plug between term. 2 and term. 11	----	(+15°C...+30°C) 1.45...3.3 k $\Omega$ (+80°C) 280...360 $\Omega$
2	↓	6 Resistance of ground terminal, output stage term. 25. At control-unit plug between term. 25 and term. 11	----	0 ... 10 $\Omega$
3	↓	7 Resistance of ground terminal, sensors term. 5. At control-unit plug between term. 5 and term. 11	----	0 ... 10 $\Omega$
4	↓	8 Resistance of all 4 parallel-connected solenoid-operated injection valves term. 13 and in series with that, the electric fuel pump. At control-unit plug between term. 13 and 11	----	1. (+15°C...+30°C) 6.50...9.00 $\Omega$ 2. (+80°C) 6.60...9.25 $\Omega$
5	↓	9 Resistance of idle contact in throttle-valve switch term. 3. At control-unit plug between term. 3 and term. 11	Pull plug off EZK ignition control unit 1. Accelerator pedal in idle position 2. Slightly depress accelerator pedal Re-attach EZK plug	1. 0 ... 10 $\Omega$ 2. $\infty\Omega$
6	↓	10 Resistance of low-idle-speed-control test pin. At control-unit plug between term. 12 and term. 11	Connect test pin to ground After testing, loosen ground	0 ... 10 $\Omega$
7	↓	11 1st winding of idle actuator and electric fuel pump in series. At control-unit plug between term. 10 and term. 11	At idle actuator at following terminals: B 23 FT up to 7.84 term. 3 and 4 B230 FT as of 8.84 term. 1 and 2	+15°C...+30°C 20 ... 32 $\Omega$ +80°C 24.5...37 $\Omega$
8	↓	12 2nd winding of idle actuator and electric fuel pump in series. At control-unit plug between term. 23 and term. 11	Idle actuator at following terminals B 23 FT up to 7.84 term. 5 and 4 B230 FT as of 8.84 term. 3 and 2	+15°C...+30°C 18.0...29.5 $\Omega$ +80°C 22.0...34.0 $\Omega$
9	↓	13 Overrun cut-off suppression (only with manually-shifted transmission in 1st and 2nd gears). At control-unit plug between term. 15 and term. 11	Engage 1st and 2nd gears Engage 3rd and 4th gears	0 ... 10 $\Omega$ $\infty\Omega$

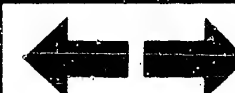
**F3**

Rapid diag. chart for univ. test adapter  
Volvo 760 GLE Turbo




**F4**

Rapid diag. chart for univ. test adapter  
Volvo 760 GLE Turbo



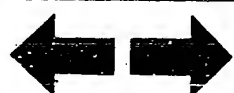


# Rapid diagnosis chart for universal test adapter (continued)

Test step	Switch position V	Ω	Measurement	Remarks Connect adapter lead only at peripheral components.	Test specifications (reading)
10	↓	21	Potentiometer for idle-mixture adjustment, resistance of potentiometer. At control-unit plug between term. 14 and term. 6	Dependent on the CO adjustment	150 ... 600 Ω
11	4	21	Voltage of starting motor term. 50 at control-unit plug between term. 4 and term. 11 (not applicable as of B 230 FT model 8.84)	Shift into neutral and start	8 ... 15 V
12	5	21	Voltage pulses of ignition trigger box ( $t_n$ ). At control-unit plug between term. 1 and term. 11	Shift into neutral and start Voltage pulse amplitude from 6 ... 11 V	
13	6	21	Button 4 Voltage of main relay term. 87. At control-unit plug between term. 9 and term. 11	Ignition "ON"	8 ... 15 V
14	7	21	Voltage of ignition coil term. 15 at control-unit plug between term. 18 and term. 11	Ignition "ON"	8 ... 15 V
15	8	21	Voltage at main relay term. 85. At control-unit plug between term. 21 and term. 11	Ignition "ON"	8 ... 15 V
16	9	21	Voltage at pump relay term. 85 via overpressure switch at control-unit plug between term. 17 and term. 11	Ignition "ON"	8 ... 15 V
			Connect adapter lead at peripheral components and control unit (ignition OFF) Then leave engine to warm up (normal operating temperature)		
17	10	21	Voltage at air-conditioner switch (if present) at control-unit plug between term. 16 and term. 11	Switch on air conditioner (approx. 2 s. until the magnetic coupling switches)	8 ... 15 V
18	3	21	Output voltage of hot-wire air-mass sensor between term. 5 and term. 3 (B 23 FT) or term. 3 and term. 2 (B 230 FT). At control-unit plug between term. 7 and term. 6	The output voltage must change as well when the engine speed changes.	2 ... 5 V

**F5**

Rapid diag. chart for univ. test adapter  
Volvo 760 GLE Turbo



**F6**

Rapid diag. chart for univ. test adapter  
Volvo 760 GLE Turbo

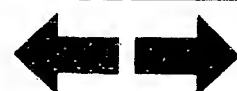


# Rapid diagnosis chart for universal test adapter (continued)

Test step	Switch position		But-ton	Measurement	Remarks	Test specifications (reading)
	V	Ω			Connect up adapter lead to periphery and control unit.	
				Lambda closed-loop control	function test	
19	11	21	-	Lambda closed-loop control, open-loop value. At control-unit plug between term. 22 and term. 11	Ω switch position 22, 23 and 24 forbidden	10 ... 13 V
20	11	22	-	Lambda closed-loop control, rich value. At control-unit plug between term. 22 and term. 11	---	10 ... 13 V
21	11	23	-	Lambda closed-loop control, lean value. At control-unit plug between term. 22 and term. 11	---	smaller than 0.5 V
22	11	24	-	Lambda closed-loop control, closed-loop value. At control-unit plug between term. 22 and term. 11	---	0 ... 13 V (alternately between small and large values)
23	11	24	-	Basic idle setting	Read off engine speed on e.g. motortester	730 ... 770 min <sup>-1</sup>
24	11	24	-	Record on/off ratio at idle actuator. At control-unit plug between term. 23 and term. 9 Attention! Engine must have temp. of at least + 80°C (normal operating temperature)	Measurement using dwell-angle tester at sockets 1 and 2 at universal test adapter  (1) Apply test pin to ground (2) Remove test pin from ground (3) Accelerate, however, speed below 2000 min <sup>-1</sup> (4) Accelerate, speed above 3000 min <sup>-1</sup> On/off ratio <u>must</u> become greater. (5) Leave engine running at idle, set air conditioner to "defrost". Speed <u>must</u> become greater.	(1) 30% (2) 31 ... 32% (3) 38...45% up to 7.84 41...74% as of 8.84 (4) Greater than 47.5% (5) Approx. 900 min <sup>-1</sup>

**F7**


Rapid diag. chart for univ. test adapter  
Volvo 760 GLE Turbo


**F8**

Rapid diag. chart for univ. test adapter  
Volvo 760 GLE Turbo



# Rapid diagnosis chart for universal test adapter (continued)

Test step	Switch position V    Ω	But-ton	Measurement	Remarks Connect adapter lead at peripheral components <u>and</u> control unit.	Test specifications (reading)	
Control-unit function test						
25	12	24	-	Check injection signal $t_i$ from control unit using oscilloscope. At control-unit plug between term. 13 and term. 11	Leave engine running at normal operating temperature	
26	12	24	1	As 25, however, after pressing button (NTC II cold) duration of injection becomes slightly longer. At control-unit plug between term. 13 and term. 11	Leave engine running at normal operating temperature	
27	12	24	2	As 25, however, after pressing button (NTC II warm) duration of injection must remain constant. At control-unit plug between term. 13 and term. 11	Leave engine running at normal operating temperature	
28	12	24	5	Overrun cut-off At control-unit plug between term. 13 and term. 11	Leave engine running at normal operating temperature. Keep engine speed constant at $2000 \text{ min}^{-1}$ . Press button 5. Injection signals cut out and cut in again at approx. $1300 \text{ min}^{-1}$ .	<u>Briefly no injection signals</u>
29	12	24	6	Full-load enrichment At control-unit plug between term. 13 and term. 11	Leave engine running at idle at normal operating temperature. On pressing button 6, injection signal must become wider and/or the engine speed must become faster:	
30	13	24	-	Hot-wire air-mass sensor. Voltage measurement of self-cleaning function. At control-unit plug between term. 8 and term. 11	Before this test, the engine must run at above $2000 \text{ min}^{-1}$ and have temperature above $+ 60^{\circ}\text{C}$ . Afterwards, ignition "OFF" → voltage reading after approx. 4 s.	<u>2 ... 5 V</u> (Duration of reading approx. 1 s)

**F9**

Rapid diag. chart for univ. test adapter  
Volvo 760 GLE Turbo



**F10**

Rapid diag. chart for univ. test adapter  
Volvo 760 GLE Turbo



## TEST SPECIFICATIONS

### Pressure regulator

- Fuel pressure: 2,8 ... 3,2 bar

### Electric fuel pump

- Fuel delivery  
(measured in the return): min. 800 cm<sup>3</sup>/30 sec.
- Connection voltage  
(under load): min. 12 V

### Lambda sensor (with heater)

- Internal electrical resistance (PTC)  
KD tolerance test value: 1 ... 10  $\Omega$

### Series resistor

- Internal electrical resistance  
(at + 20°C): 5 ... 7  $\Omega$

### Temperature sensor II (engine) (blue plug)

- Internal electrical resistance at  
Ambient temperature  
(+15°C...+30°C): 1,45 ... 3,3 k $\Omega$   
Engine at normal operating temperature  
(approx. +80°C): 280 ... 360  $\Omega$

### Solenoid-operated injection valve (at +15°C...+30°C):

- Internal electrical resistance: 2,0 ... 3,0  $\Omega$



## Hot-wire air-mass sensor

### ● Internal electrical resistance:

Engine B 23 FT up to 7.84

between term. 12 and term. 6)

or term. 6 and term. 3)

0 ... 1100 $\Omega$

between term. 7 and term. 6)

or term. 5 and term. 3)

3.6...4.1  $\Omega$

Engine B 230 FT as of 8.84

between term. 6 and term. 2

0 ... 1100 $\Omega$

between term. 3 and term. 2

2.5...3.1  $\Omega$

### Idle actuator

### ● Internal electrical resistance at (+15°C...+30°C):

B 23 FT

between term. 4 and term. 5

17 ... 22.5 $\Omega$

between term. 4 and term. 3

19 ... 25.0 $\Omega$

B 230 FT

between term. 2 and term. 3

17 ... 22.5 $\Omega$

between term. 2 and term. 1

19 ... 25.0 $\Omega$

### Idle adjustment, engine at norm. op. temp.,

approx. +80°C

Man.-shifted and automatic trans.: 730...770 min<sup>-1</sup>

### Integrator voltage setting (lambda closed-loop control)

#### ● Closed-loop control mode (sensor connected):

voltage reading fluctuates between 0 and 13 V

#### ● Open-loop control mode (sensor

lead disconnected):

10 ... 13 V

Rich value (disconnect sensor

lead and apply to ground at

control-unit end):

10 ... 13 V

Lean value (apply 2 V to

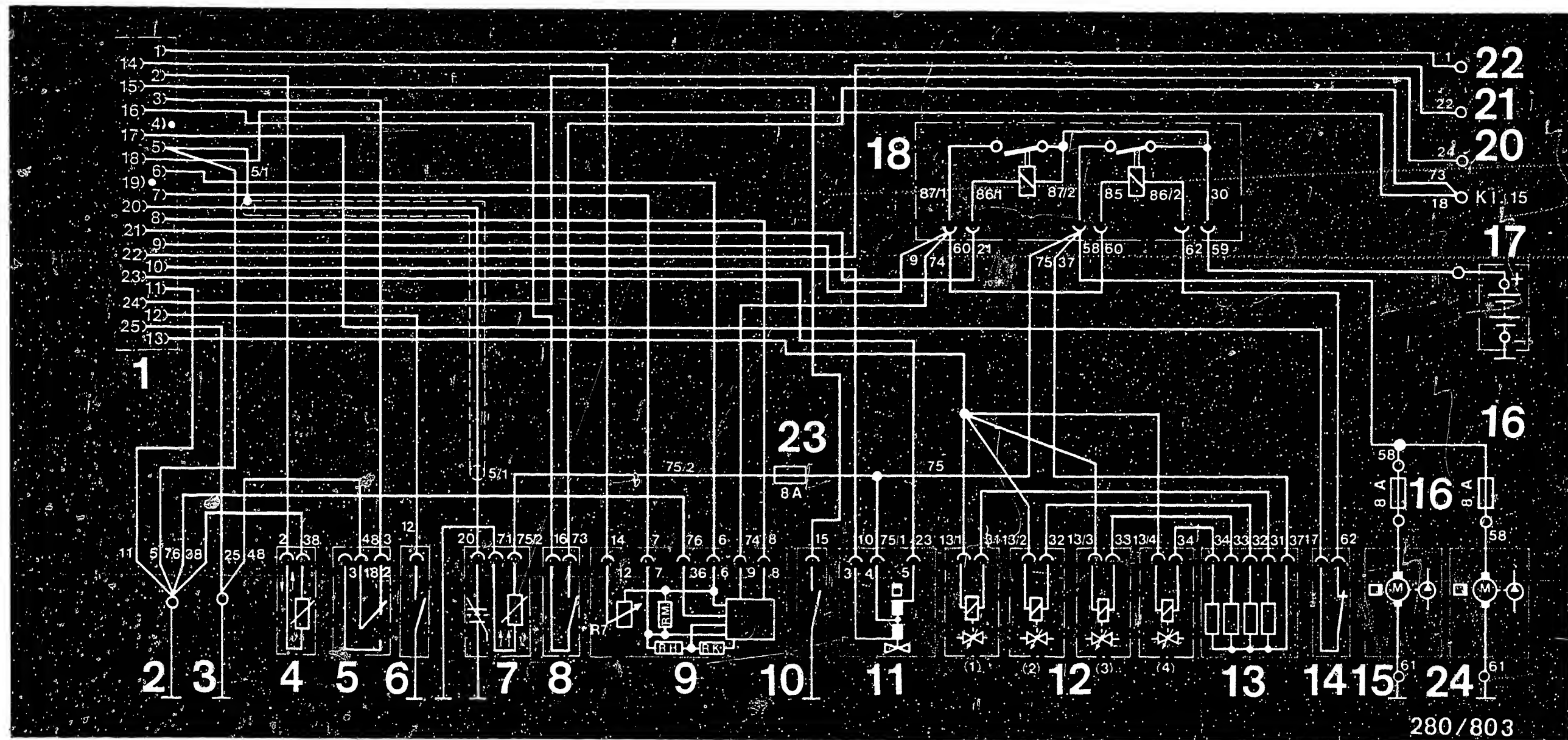
sensor lead at control-unit end):

smaller than  
approx. 0.5 V

Sensor must be hot, otherwise only open-loop control mode

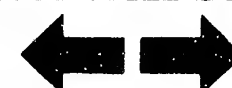
See equipment and Autodata microcards for settings for ignition, valve clearance and other engine-related data.



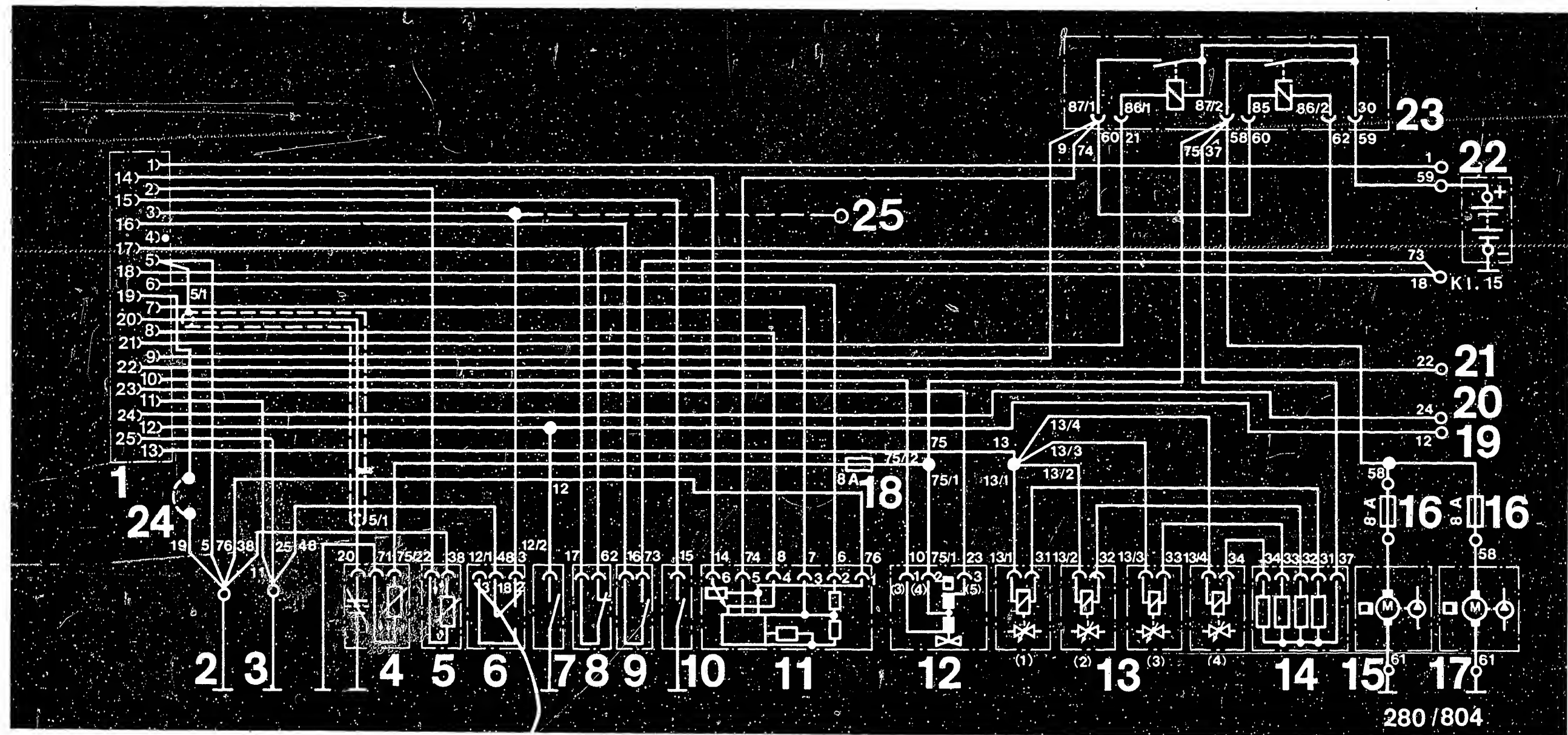


Electrical terminal diagram B 23 FT up to 7.84

- |                                   |   |                                      |                                |
|-----------------------------------|---|--------------------------------------|--------------------------------|
| 1 = Control-unit plug             | 8 = Air-conditioner switch                            | 14 = Overpressure switch             | 21 = Integrator output         |
| 2 = Ground terminal, sensors      | 9 = Hot-wire air-mass sensor                          | 15 = Electric fuel pump              | 22 = $t_n$ (speed information) |
| 3 = Ground terminal, output stage | 10 = Overrun-cutoff suppression for 1st and 2nd gears | 16 = Pump fuses                      | 23 = Fuse for sensor heater    |
| 4 = Temperature sensor II         | 11 = Idle actuator                                    | 17 = Battery                         | 24 = In-tank pre-supply pump   |
| 5 = Throttle-valve switch         | 12 = Solenoid-operated injection valves               | 18 = Relay set, main and pump relays |                                |
| 6 = Test pin                      |   | 20 = $t_q$ output                    |                                |
| 7 = Lambda sensor (heated)        | 13 = Series resistors                                 |                                      |                                |







Electrical terminal diagram B 230 FT as of 8.84

- |                                   |   |   |  |
|-----------------------------------|---|---|--|
| 1 = Control-unit plug             | 9 = Air-conditioner system switch                     | 16 = Pump fuses                                     | 21 = Test output, integrator voltage                               |
| 2 = Ground terminal, sensors      | 10 = Overrun cutoff suppression for 1st and 2nd gears | 17 = In-tank pre-supply pump                        | 22 = Ignition point independent tripping signal ( $t_n$ ) term. 17 |
| 3 = Ground terminal, output stage | 11 = Hot-wire air-mass sensor                         | 18 = Fuse for sensor heater                         | 23 = Relay set (main and pump relays)                              |
| 4 = Heated lambda sensor          | 12 = Idle actuator                                    | 19 = Output to knock control term. 15               | 24 = Bridge for data coding  |
| 5 = Temperature sensor II         | 13 = Solenoid-operated injection valves               | 20 = Load signal for the ignition ( $t_q$ ) term. 8 | 25 = EZK ignition control unit, term. 7                            |
| 6 = Throttle-valve switch         | 14 = Series resistors                                 |   |  |
| 7 = Test pin                      | 15 = Electric fuel pump                               |   |  |
| 8 = Overpressure switch           |   |   |  |

**F15**

Electrical terminal diagram  
Volvo 760 GLE Turbo

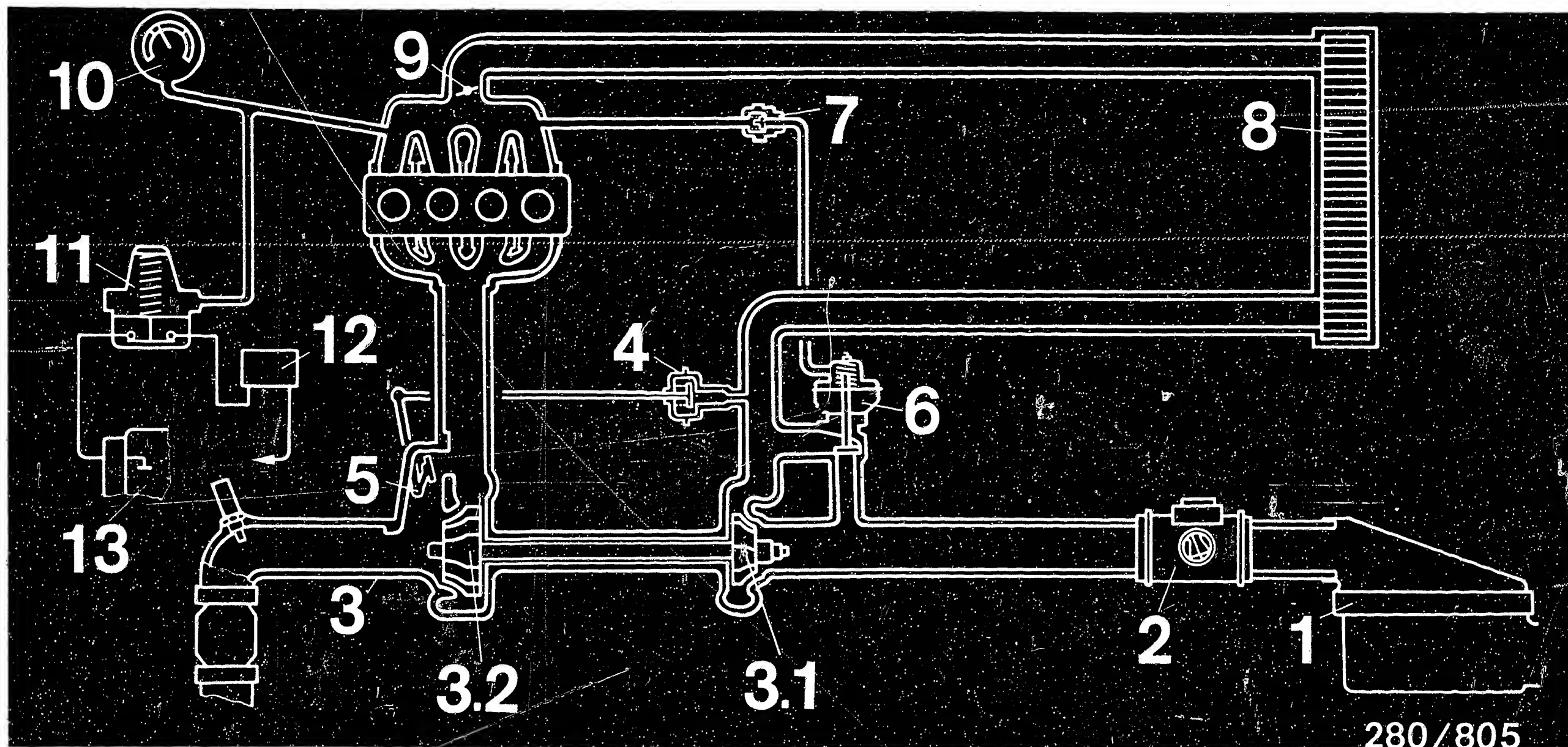


**F16**

Electrical terminal diagram  
Volvo 760 GLE Turbo







Overview diagram of exhaust turbo-supercharger system

- |                                |                                       |                                    |                          |
|--------------------------------|---------------------------------------|------------------------------------|--------------------------|
| 1 = Air filter                 | 4 = Charge-air-pressure control valve | 8 = Intercooler                    | 11 = Overpressure switch |
| 2 = Hot-wire air-mass sensor   | 5 = Wastegate                         | 9 = Throttle valve                 | 12 = Pump relay          |
| 3 = Exhaust turbo-supercharger | 6 = Bypass valve                      | 10 = Charge-air-pressure indicator | 13 = LH control unit     |
| 3.1 = Compressor               | 7 = Vacuum time-delay relay           |                                    |                          |
| 3.2 = Turbine                  |                                       |                                    |                          |

**F17**

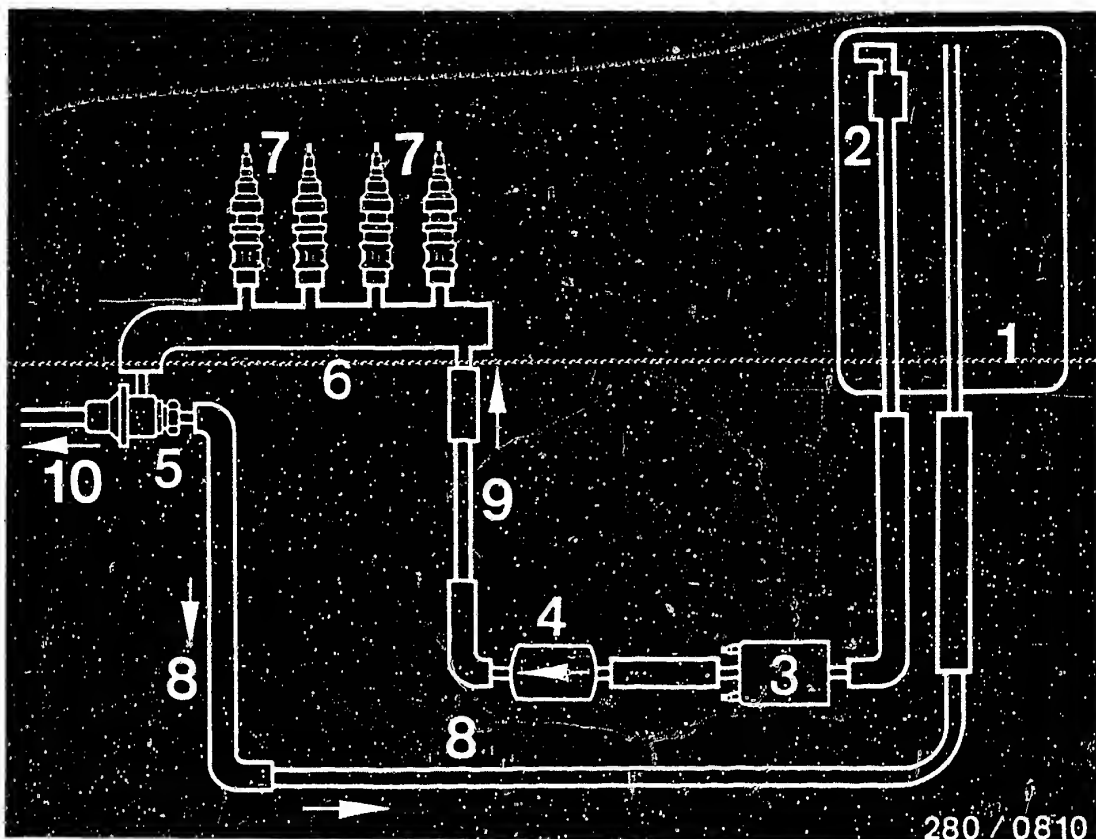
Overview diag. and exhaust turbo-superch.  
Volvo 760 GLE Turbo



**F18**

Overview diag. and exhaust turbo-superch.  
Volvo 760 GLE Turbo

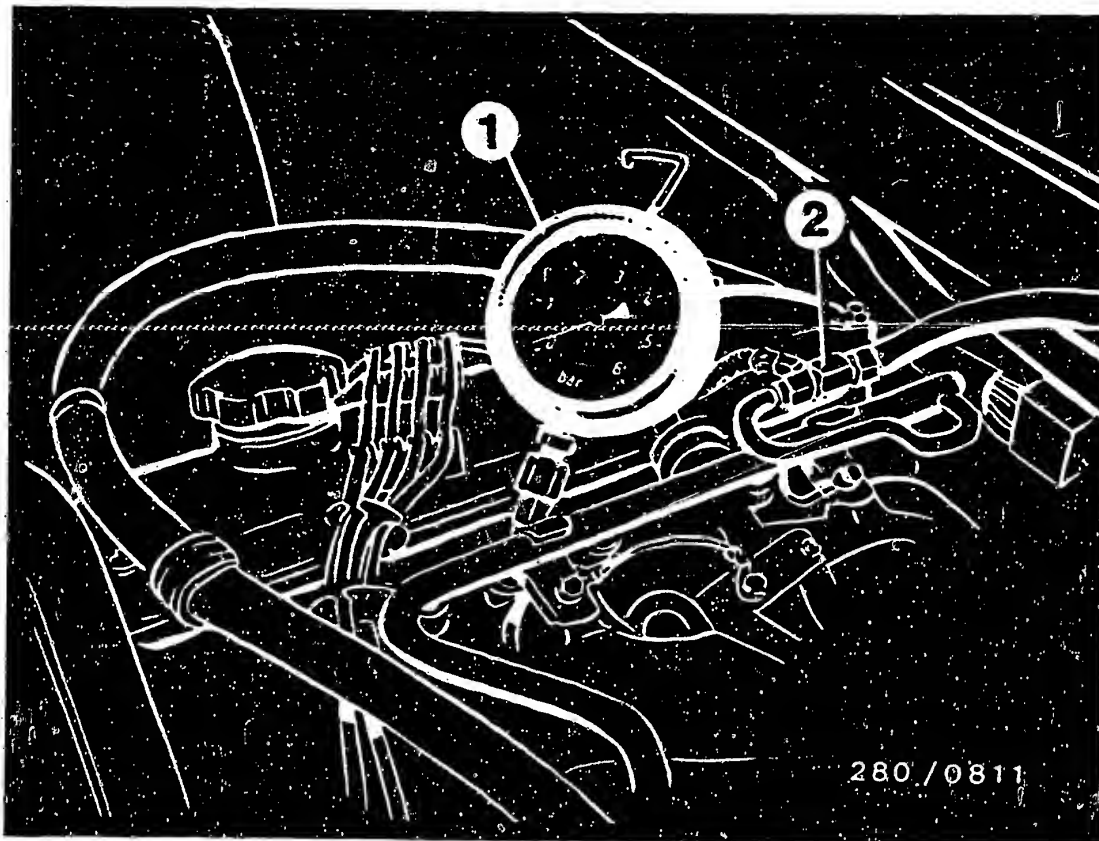




- 1 = Fuel tank
- 2 = Fuel pre-supply pump (in the tank)
- 3 = Electric fuel pump
- 4 = Fuel filter
- 5 = Pressure regulator
- 6 = Fuel distribution pipe
- 7 = Solenoid-operated injection valves
- 8 = Fuel return line
- 9 = Fuel delivery line
- 10 = To the intake manifold

#### FUEL LINE DIAGRAM

The fuel supply and return lines run along on the left on the bottom of the vehicle.



Similar to Volvo Turbo

1 = Pressure gauge or pressure-measuring device

KDJE P 100/14

2 = Connection piece KDJE-P 100/14

### Fuel-pressure test

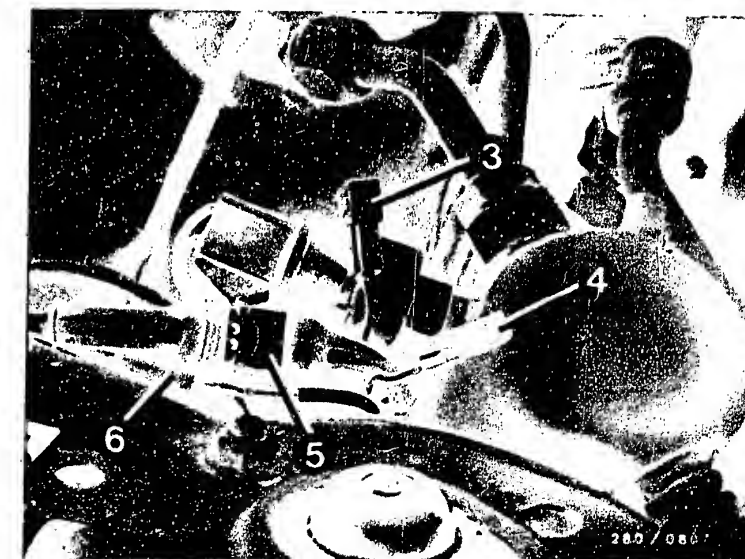
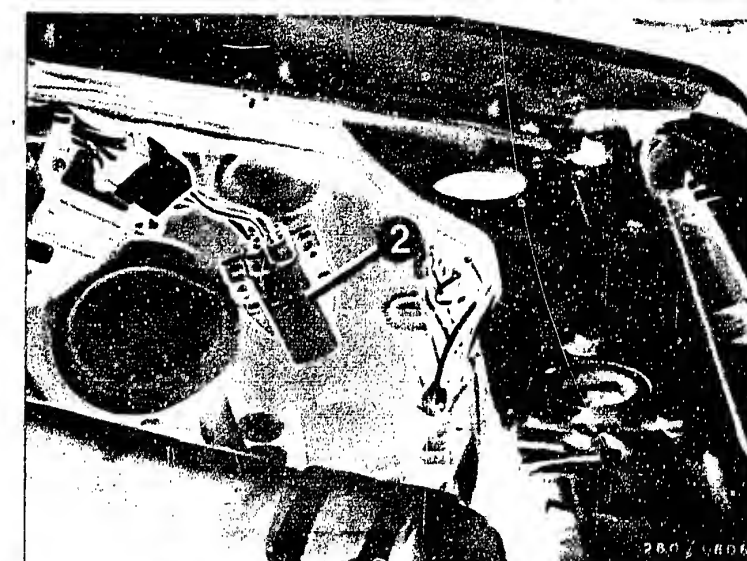
- Connect pressure gauge or pressure-measuring device. Unscrew fuel-injection tubing at fuel-distribution pipe.  
Attention! When unscrewing the hose, make sure that fuel does not come into contact with hot engine components.
  - Connect connection piece KDJE-P 100/14 in between in series.
  - When using the pressure-measuring device KDJE-P 100, the valve screw must be closed, in the case of KDEP 1034, only the right-hand valve screw.
- Make sure that connection is tight.

Installation position of components B 23 FT similar to B 230 FT

- 1 = Control unit
- 3 = Series resistors
- 3 = Test pin (LFR), red lead\*
- 4 = Integrator output, white/black\*
- 5 = Plug connection for heater (lambda sensor)
- 6 = Lambda-sensor plug connection

The control unit is positioned in the passenger-side footwell at the right behind a cover. Pump fuse, main relay and pump relay are positioned in the passenger compartment, center console behind the ashtray.

\* B 230 FT as of 8.84 test pin (red/white) and integrator output (green/white) are housed in a double plug in the engine compartment at the right between air filter and the fluid reservoir for the steering booster.



**F21**

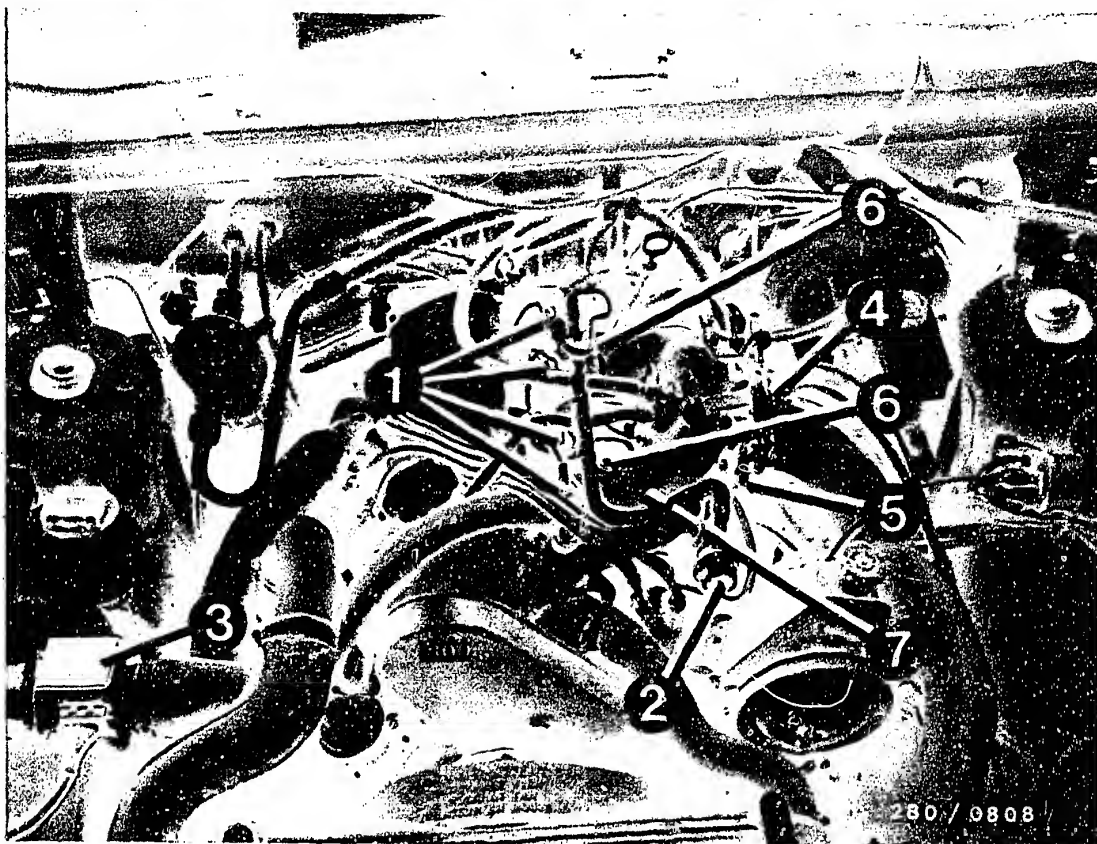
Installation position of components  
Volvo 760 GLE Turbo



**F22**

Installation position of components  
Volvo 760 GLE Turbo

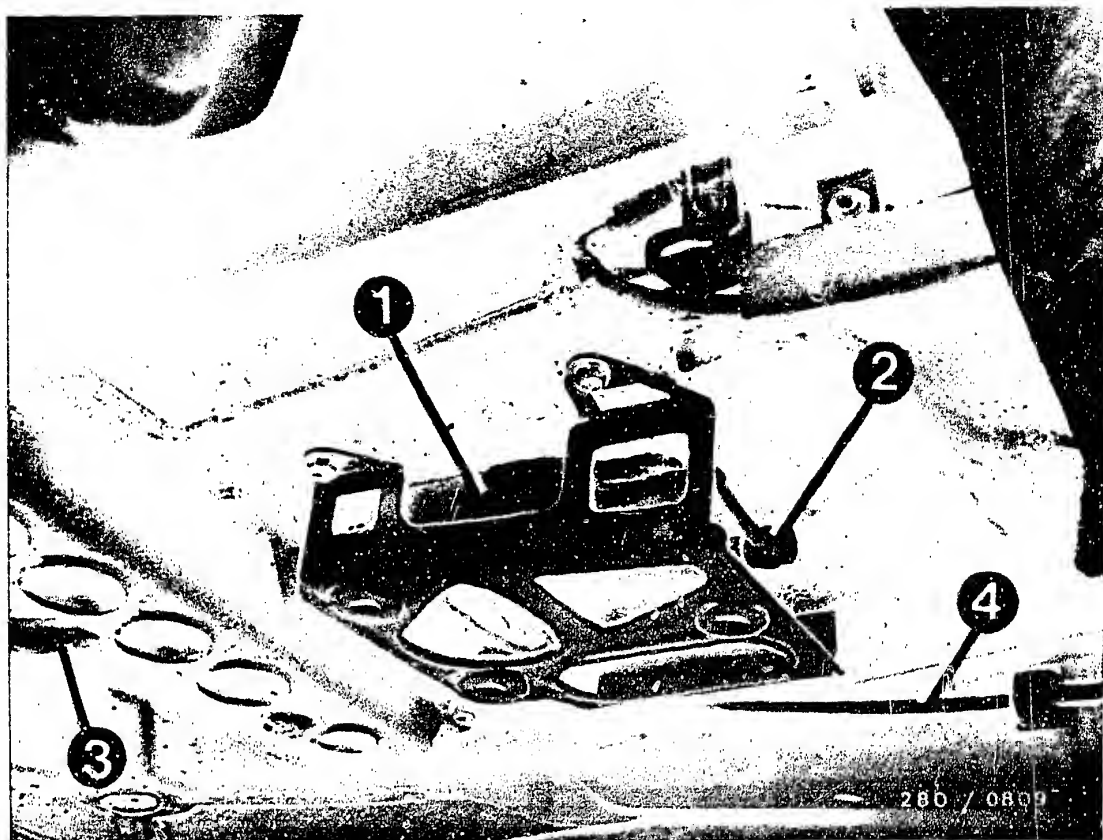




Installation position of components (continued)  
B 23 FT, B 230 FT similar

- 1 = Solenoid-operated injection valves
- 2 = Pressure regulator
- 3 = Hot-wire air-mass sensor
- 4 = Throttle-valve switch
- 5 = Adjusting screw for basic speed
- 6 = Ground terminals
- 7 = Idle actuator





- 1 = Electric fuel pump
- 2 = Fuel filter
- 3 = Fuel suction line
- 4 = Fuel-injection tubing

Pre-supply pump in fuel tank (access gained from trunk).



# TABLE OF CONTENTS

## Section

## Coordinates

Special features	G 1
Rapid diagnosis chart for universal test adapter	G 2
Test specifications	G 13
Electrical terminal diagram for 740 GLE	G 15
Electrical terminal diagram for 240 GLE	G 17
Diagram of fuel lines	G 19
Fuel pressure test	G 20
Installation position of components	G 21





## Special features

- Digital LH control unit
- Hot-wire air-mass sensor instead of an air-flow sensor
- Idle actuator instead of an auxiliary-air device (idle speed control)
- Relay set (main and pump relay) instead of two single relays
- Cold-start control
- Heated lambda sensor
- In-tank pre-supply pump

The vehicle is available in the USA and in the Federal Republic of Germany, has lambda closed-loop control, 3-way catalytic converter and idle speed control.

The test with the universal test adapter and LH adapter lead checks the control unit and peripherals.

As of 9.84 version LH 2.2 with control unit 0 280 000 511

### Note

The LH2-Jetronic in the Volvo 240/740 GLE is basically the same as that in the Volvo 240 GLE up to 8.84

- Similar SIS repair instructions:  
SIS microcard VOL 505

## Rapid diagnosis chart for universal test adapter










The following rapid diagnosis chart makes it possible for the experienced L-Jetronic expert to quickly check the electrical part of the system with the universal test adapter.

The rapid diagnosis chart contains the following information:

- Sequence of test steps
- Settings of V and  $\Omega$  program switches
- Notes on how to operate the universal test adapter or other components
- Test specifications for motortester and multimeter



# Rapid diagnosis chart for universal test adapter

Test step	Switch setting		Measurement	Remarks	Test specifications (Reading)
	V.	$\Omega$			
1		5	Resistance of temperature sensor NTC II term. 2 (engine temperature). On control-unit plug between term. 2 and term. 11	-----	$(+15^{\circ}\text{C}...+30^{\circ}\text{C})$ $1.45...3.3 \text{ k}\Omega$ $(+80^{\circ}\text{C}) 280 ...360 \Omega$
2		6	Resistance of output stage ground terminal term. 25. On control-unit plug between term. 25 and term. 11	-----	$0 ... 10 \Omega$
3		7	Resistance of sensors ground terminal term. 5. On control-unit plug between term. 5 and term. 11	-----	$0 ... 10 \Omega$
4		8	Resistance of all 4 parallel-connected injection valves term. 13 and, in series with them, the electric fuel pump. On control-unit plug between term. 13 and 11	-----	$1. (+15^{\circ}\text{C}...+30^{\circ}\text{C})$ $7.00...9.50 \Omega$ $2. (+80^{\circ}\text{C})$ $7.20...10.00 \Omega$
5		9	Resistance of idle contact in throttle-valve switch term. 3. On control-unit plug between term. 3 and term. 11	1. Accelerator in rest position 2. Accelerator in full-load position	1. $0 ... 10$ 2. $\infty \Omega$
6		10	Idle speed control test pin resistance. On control-unit plug between term. 12 and term. 11	Connect test pin (red/white) to ground After testing, undo ground connection.	$0 ... 10 \Omega$
7		11	1st idle actuator winding and electric fuel pump in series. On control-unit plug between term. 10 and term. 11	Test at idle actuator at following terminals: term. 1 and 2	$+15^{\circ}\text{C}...+30^{\circ}\text{C}$ $20... 32 \Omega$ $+80^{\circ}\text{C} 24.5...37 \Omega$
8		12	2nd idle actuator winding and electric fuel pump in series. On control-unit plug between term. 23 and term. 11	Test idle actuator at following terminals: term. 3 and 2	$+15^{\circ}\text{C}...+30^{\circ}\text{C}$ $18.0 ... 29.5 \Omega$ $+80^{\circ}\text{C}$ $22.0 ... 34.0 \Omega$
9		13	Overrun cutoff suppression (only with manual transmission in 1st and 2nd gear). On control-unit plug between term. 15 and term. 11	Select 1st and 2nd gears Select 3rd and 4th gears	$0 ... 10 \Omega$ $\infty \Omega$

**G3**

Rapid diagnosis chart  
Volvo 240/740 GLE



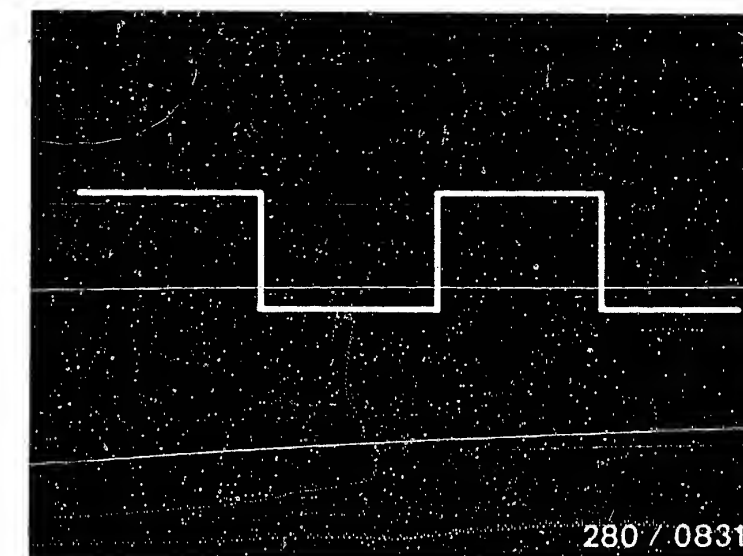
**G4**

Rapid diagnosis chart  
Volvo 240/740 GLE



# Rapid diagnosis chart for universal test adapter

Test step	Switch setting		But-ton	Measurement	Remarks	Test speci-fications (Reading)
	V	$\Omega$				
10	↓	14		Data encoding On control-unit plug between term. 19 and term. 11	Jumper on control-unit plug	0 ... 10 $\Omega$
11	↓	21		Potentiometer for idle mixture adjustment, resistance of potentiometer. On control-unit plug between term. 14 and term. 6	dependent on CO adjustment	150...600 $\Omega$
12	5	21		Voltage pulses in ignition trigger box ( $t_n$ ). On control-unit plug between term. 1 and term. 11.	Ignition "ON". Measure $t_n$ signal with oscilloscope. Shift to neutral and start	see top diagram
13	6	21	4	Voltage from main relay term. 87. On control-unit plug between term. 9 and term. 11.	Ignition "ON"	8 ... 15 V
14	7	21		Voltage from ignition coil term. 15. On control-unit plug between term. 18 and term. 11	Ignition "ON"	8 ... 15 V
15	8	21		Voltage at main relay (winding) term. 85. On control-unit plug between term. 21 and term. 11	Ignition "ON"	8 ... 15 V
16	9	21	4	Voltage at pump relay (winding) term. 85. On control-unit plug between term. 17 and term. 11	Ignition "ON"	8 ... 15 V

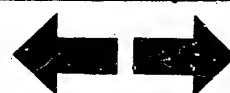


$t_n$  signal

Voltage pulse amplitude of 6...11 V

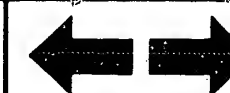
**G5**

Rapid diagnosis chart  
Volvo 240/740 GLE



**G6**

Rapid diagnosis chart  
Volvo 240/740 GLE



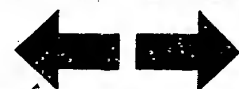
# Rapid diagnosis chart for universal test adapter (continued)

Test step	Switch setting		But-ton	Measurement	Remarks	Test specifications (Reading)
	V	$\Omega$			Connect adapter lead to peripherals only	
				Connect adapter lead to peripherals and control unit (ignition OFF) Then warm engine up (normal operating temperature)		
17	10	21	-	Voltage at air conditioner switch (if applicable) on control-unit plug between term. 16 and term. 11	Switch on air conditioner (magnetic clutch switches after approx. 2 sec)	<u>8 ... 15 V</u>
18	3	21	-	Output voltage of hot-wire air-mass sensor between term. 3 and term. 2. On control-unit plug between term. 7 and term. 6	Output voltage must change as engine speed changes	<u>2 ... 5 V</u>
				Functional test of lambda closed-loop control		
19	11	21	-	Lambda closed-loop control open-loop value. On control-unit plug between term. 22 and term. 11	$\Omega$ switch settings 22, 23 and 24 not allowed.	<u>10 ... 13 V</u>
20	11	22	-	Lambda closed-loop control rich value. On control-unit plug between term. 22 and term. 11	-----	<u>10 ... 13 V</u>
21	11	23	-	Lambda closed-loop control lean value. On control-unit plug between term. 22 and term. 11	Reading is obtained after approx. 5 sec.	<u>less than 0.5 V</u>
22	11	24	-	Lambda closed-loop control closed-loop value. On control-unit plug between term. 22 and term. 11	-----	<u>0 ... 13 V</u> (alternating between low and high value)
23	11	24	-	Basic idle setting	Let engine run at normal operating temperature. Read off engine speed on motortester. Adjust if necessary. Electrical devices off.	<u>730 ... 770 min<sup>-1</sup></u>

**G7**

Rapid diagnosis chart

Volvo 240/740 GLE



**G8**

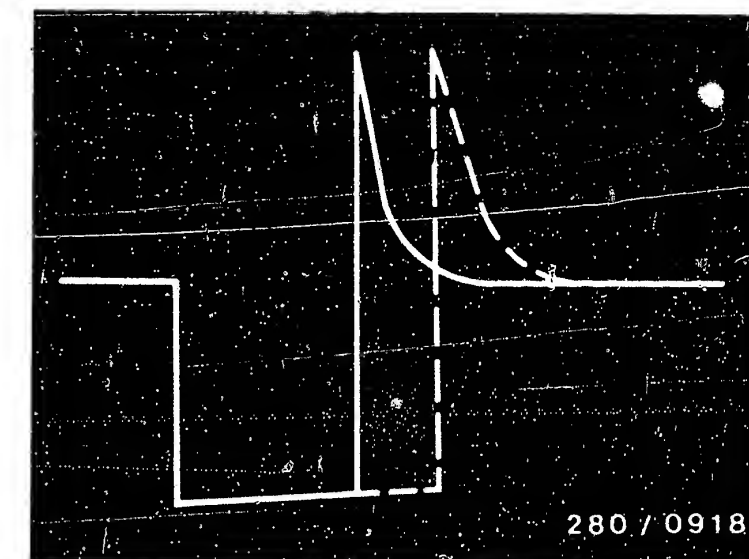
Rapid diagnosis chart

Volvo 240/740 GLE



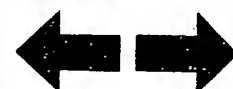
# Rapid diagnosis chart for universal test adapter

Test step	Switch setting		But-ton	Measurement	Remarks	Test specifications (Reading)
	V	$\Omega$				
24	11	24	3	Measure on/off ratio at idle actuator.	Measurement with dwell angle tester at sockets 1 and 2 (1) Touch test pin against ground (2) Test pin away from ground (3) Open throttle, but engine speed below 2000 min <sup>-1</sup> (4) then switch on air conditioner (if applicable) (5) Open throttle, engine speed above 3000 min <sup>-1</sup> . On/off ratio <u>must</u> incr. Engine speed <u>rises</u> .	(1) 29...30.5% (2) 31...32.5% (3) 36...43% (4) must increase by approx. 3% (5) greater than 42% n = 880 ... 920 min <sup>-1</sup>
25	12	24	-	Functional test of control unit (engine at operating temperature). Test injection signal t <sub>i</sub> from control unit with oscilloscope. On control-unit plug between term. 13 and term. 11	Let engine run at normal operating temperature	<u>see</u> <u>top</u> <u>diagram</u>
26	12	24	1	As 24, but after pressing button (NTC II - cold) duration of injection becomes slightly longer, and/or rise in engine speed	Let engine run at normal operating temperature	Engine speed rises above 2000 min <sup>-1</sup> and/or see top diagram



**G9**

Rapid diagnosis chart  
Volvo 240/740 GLE



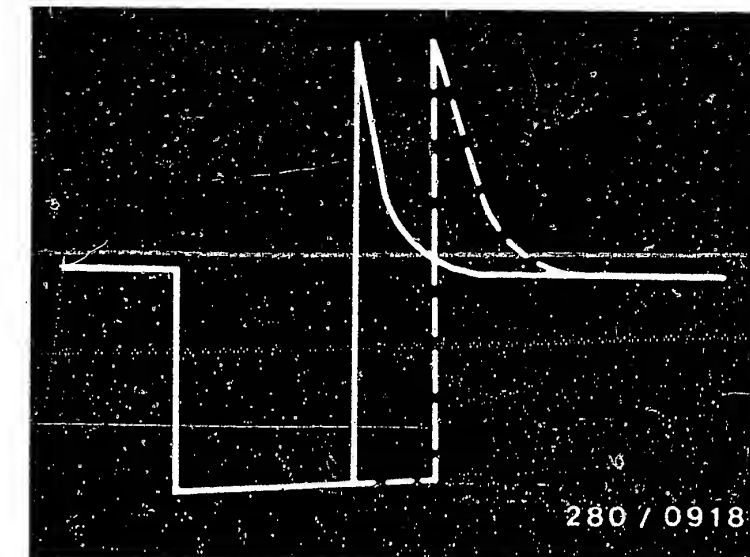
**G10**

Rapid diagnosis chart  
Volvo 240/740 GLE



# Rapid diagnosis chart for universal test adapter

Test step	Switch setting		But-ton	Measurement	Remarks	Test speci-fications (Reading)
	V	$\Omega$				
27	12	24	2	As 24, but after pressing button (NTC II - warm) duration of injection must remain constant.	Let engine run at normal operating temperature.	see top diagram
28	12	24	5	Functional test of control unit. Overrun cutoff. On control-unit plug between term. 13 and term. 11	Let engine run at normal operating temperature. Hold engine speed constant at 2000 min <sup>-1</sup> . Press button 5. Injection signals stop and resume again at approx. 1300 min <sup>-1</sup> .	Briefly no injection signals
29	12	24	6	Functional test of control unit. Full-load enrichment. On control-unit plug between term. 13 and term. 11	Let engine run at idle and at normal operating temperature. Injection signal must become wider and/or the engine speed must increase when button 6 is pressed.	see top diagram
30	13	24	-	Hot-wire air-mass sensor. Voltage measurement of self-cleaning function. On control-unit plug between term. 8 and term. 11	Before this test, the engine must have run at above 2000 min <sup>-1</sup> and the engine temperature must have been greater than +60°C. Then switch ignition "OFF" - voltage reading after approx. 4 sec.	2 ... 5 V (duration of reading approx. 1sec)



**G11**

Rapid diagnosis chart  
Volvo 240/740 GLE



**G12**

Rapid diagnosis chart  
Volvo 240/740 GLE



## Test specifications

### Pressure regulator

- Fuel pressure 2.3 ... 2.7 bar

### Electric fuel pump

- Fuel delivery (measured in return): min. 700 cm<sup>3</sup>/30s
- Terminal voltage (under load): min. 12 V

### Lambda sensor (heated)

- electrical internal resistance (PTC tolerance checking value for after-sales service (measured with engine off): 1 ... 15  $\Omega$

### Temperature sensor II (engine) (blue plug)

- electrical internal resistance at ambient temperature (+15°C...+30°C): 1.45 ... 3.3 k $\Omega$   
engine at op. temp. (approx. +80°C): 280 ... 360  $\Omega$

### Solenoid-operated injection valve (at +15°C...+30°C):

- electrical internal resistance 15.0 ... 17.5  $\Omega$

### Hot-wire air-mass sensor

- electrical internal resistance  
between term. 6 and term. 2 0 ... 1100  $\Omega$   
between term. 3 and term. 2 2.5 ... 3.1  $\Omega$





### Cold-start control

- Voltage measurement at an injection valve while starting:  
Decreasing from approx. 2.5 V after approx. 10 sec, less than 0.5 V
- Make sure of following before testing:
  - Disconnect all injection valves
  - Connect a reference valve to one of the connectors
  - Connect spark gap to term. 4 and ground
  - Disconnect NTC II and connect NTC 0 280 130 028 (at +15°C...+30°C) 10 k $\Omega$ .  
Connect voltmeter to reference valve.

### Idle actuator

- electrical internal resistance at (+15°C...+30°C):
  - between term. 2 and term. 3 17 ... 22.5  $\Omega$
  - between term. 2 and term. 1 19 ... 25.0  $\Omega$

Idle adjustment, engine normal operating temperature, approx. +80°C

Manual and automatic transmission: 730 ... 770 min<sup>-1</sup>

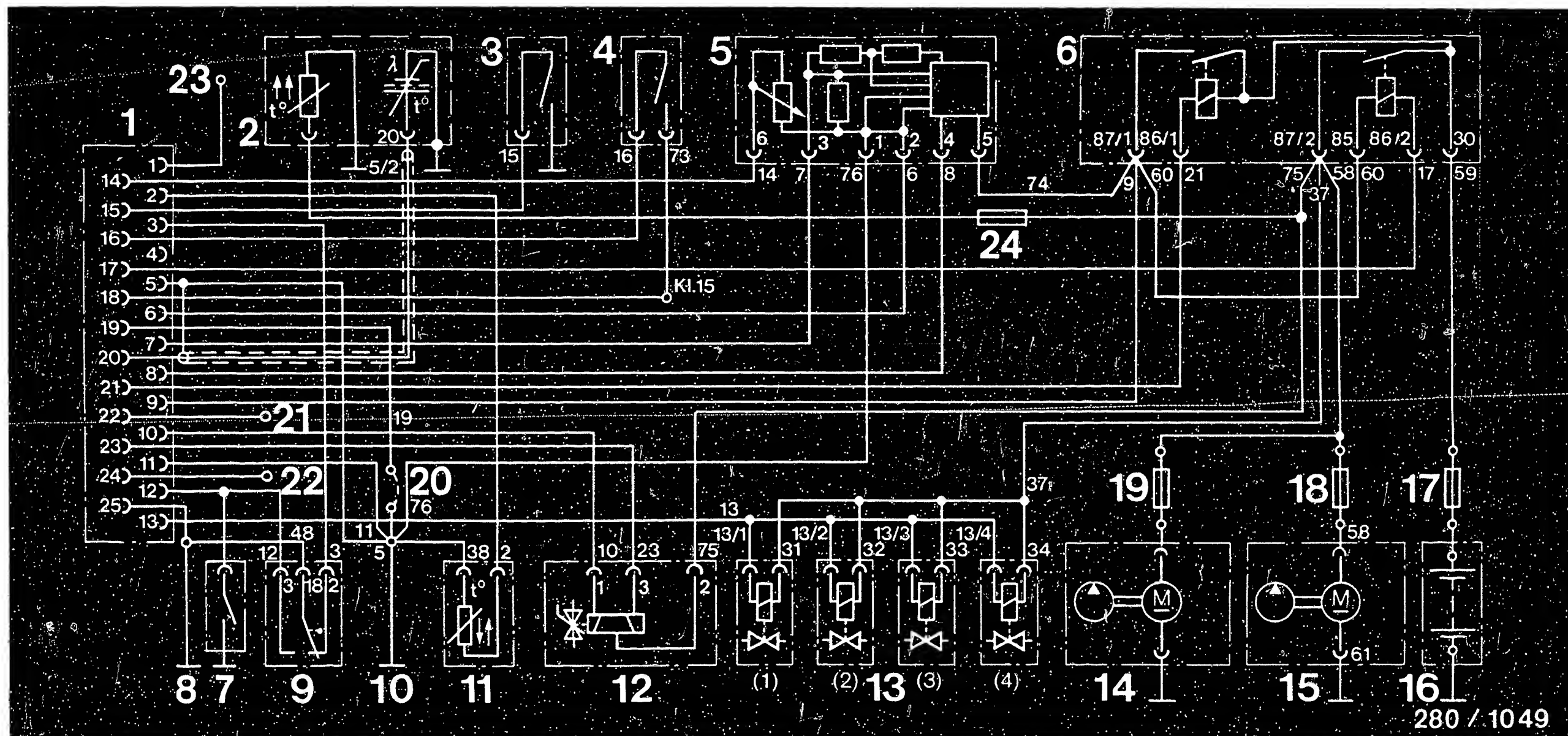
Integrator voltage setting (lambda closed-loop control)

- Closed-loop mode (sensor connected): Voltage reading fluctuates between 0 and 13 V
- Open-loop mode (sensor lead taken apart): 10 ... 13 V
  - Rich value (take sensor lead apart and ground control-unit end): 10 ... 13 V
  - Lean value (apply 2 V to control-unit end of sensor lead): less than approx. 0.5 V

Sensor must be hot, otherwise only open-loop mode

See equipment and Autodata microcards for settings for ignition, valve clearance and other engine data.





- 1 = Control-unit plug
- 2 = heated lambda sensor
- 3 = Overrun cutoff suppression for 1st + 2nd gear
- 4 = Air conditioner (switch)
- 5 = Hot-wire air-mass sensor
- 6 = Relay set (main and pump relays)
- 7 = Idle controller (test pin)

- 8 = Output stage ground terminal
- 9 = Throttle-valve switch
- 10 = Electronics ground terminal
- 11 = Temperature sensor II
- 12 = Idle actuator
- 13 = Injection valves
- 14 = In-tank pump
- 15 = Electric fuel pump
- 16 = Battery

- 17 = Blade-type fuse
- 18 = Pump fuse (fuel pump)
- 19 = Pump fuse (in-tank pump)
- 20 = Jumper for data encoding
- 21 = Integrator output
- 22 = Load signal for ignition ( $t_q$ ) term. 8 (ignition trigger box)
- 23 = Ignition timing independent trigger signal ( $t_n$ ) term. 17 ignition trigger box
- 24 = Fuse for sensor heating

ELECTRICAL TERMINAL DIAGRAM for Volvo 740 GLE

**G15**

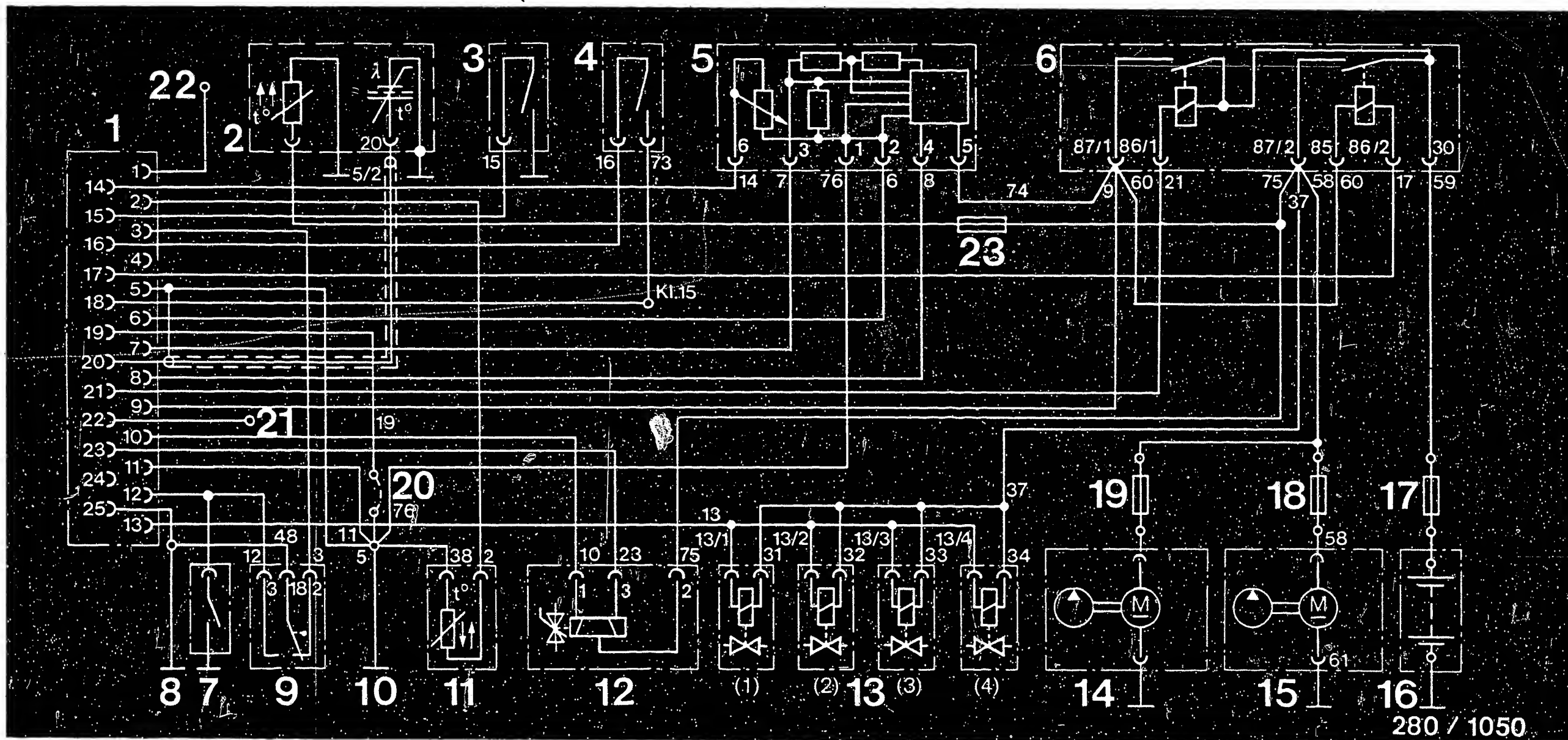
Electrical terminal diagram  
Volvo 240/740 GLE



**G16**

Electrical terminal diagram  
Volvo 240/740 GLE





- |  |                                  |   |
|--|----------------------------------|---|
| 1 = Control-unit plug                                | 8 = Output stage ground terminal | 17 = Blade-type fuse  |
| 2 = heated lambda sensor                             | 9 = Throttle-valve switch        | 18 = Pump fuse (fuel pump)  |
| 3 = Overrun cutoff suppression<br>for 1st + 2nd gear | 10 = Electronics ground terminal | 19 = Pump fuse (in-tank pump)   |
| 4 = Air conditioner (switch)                         | 11 = Temperature sensor II       | 20 = Jumper for data encoding   |
| 5 = Hot-wire air-mass sensor                         | 12 = Idle actuator               | 21 = Integrator output  |
| 6 = Relay set (main and pump<br>relays)              | 13 = Injection valves            | 22 = Ignition timing independent trigger<br>signal ( $t_n$ ) term. 8 ignition trigger box |
| 7 = Idle controller (test pin)                       | 14 = In-tank pump                | 23 = Fuse for sensor heating  |
|  | 15 = Electric fuel pump          |   |
|  | 16 = Battery                     |   |

ELECTRICAL TERMINAL DIAGRAM for Volvo 240 GLE

**G17**

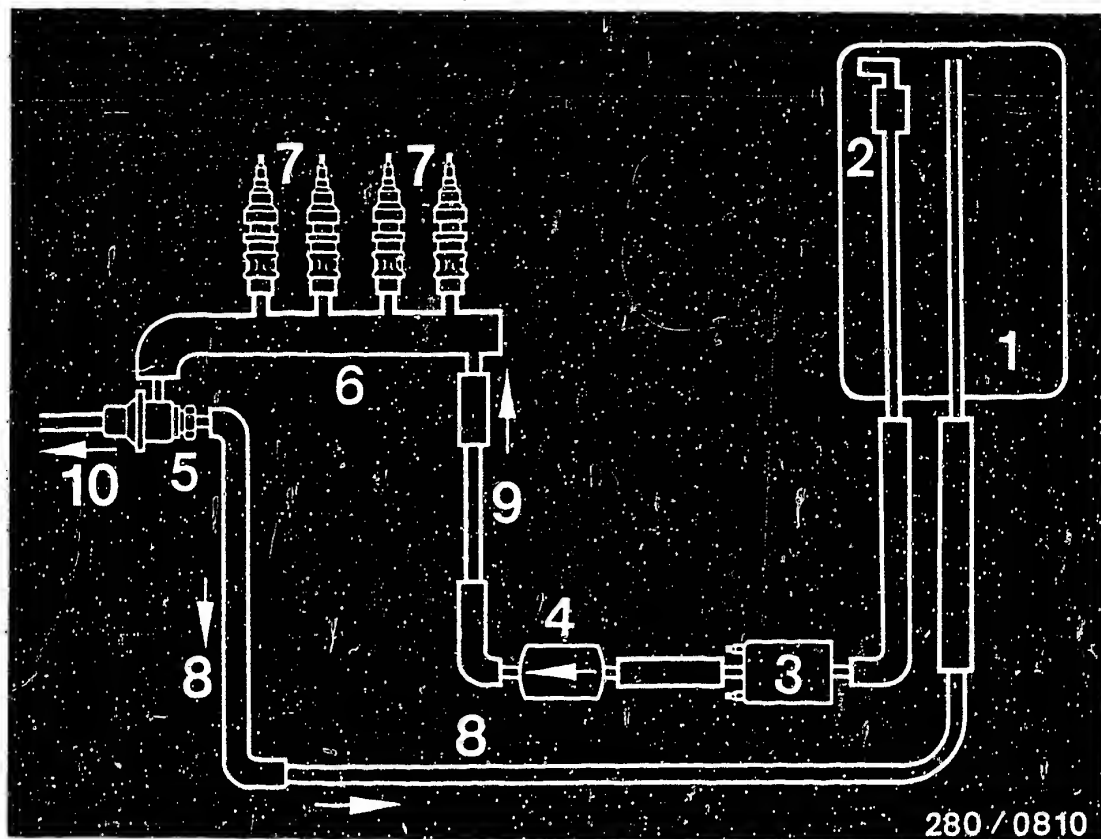
Electrical terminal diagram  
Volvo 240/740 GLE



**G18**

Electrical terminal diagram  
Volvo 240/740 GLE



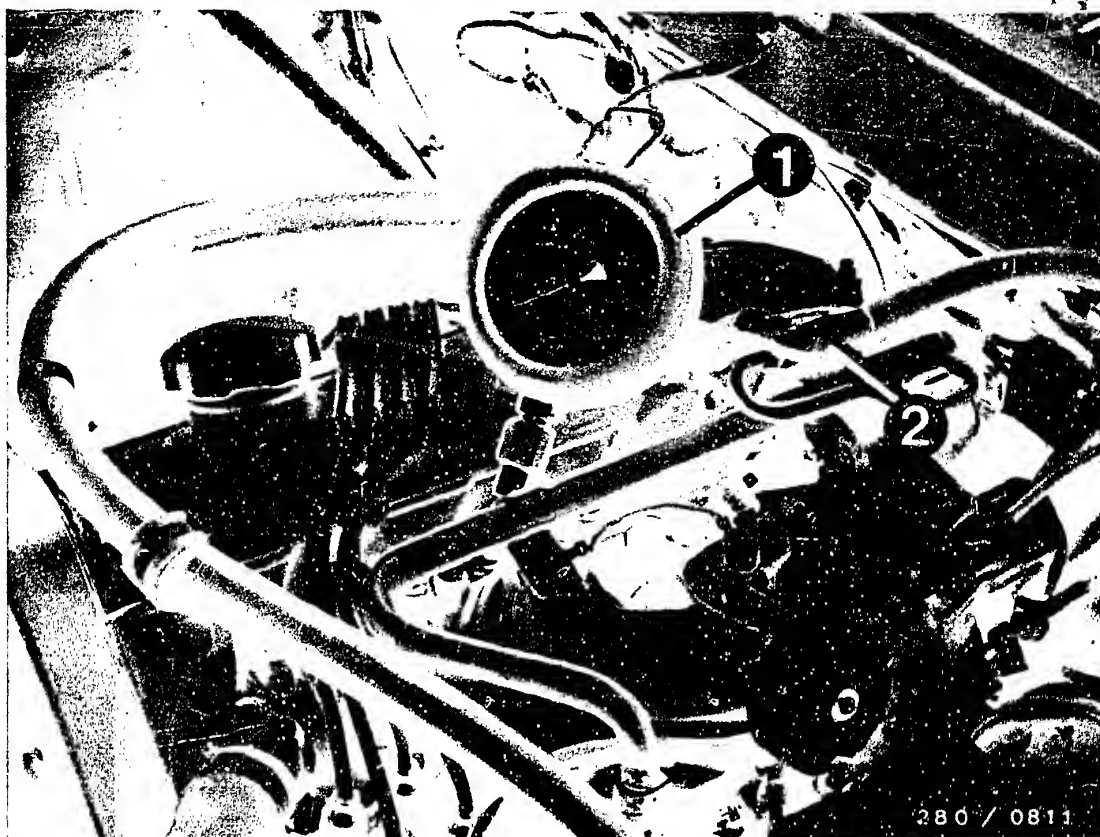


280 / 0810

- 1 = Fuel tank
- 2 = Fuel pre-supply pump (in tank)
- 3 = Electric fuel pump
- 4 = Fuel filter
- 5 = Pressure regulator
- 6 = Fuel-distribution pipe
- 7 = Solenoid-operated injection valves
- 8 = Fuel return line
- 9 = Fuel delivery line
- 10 = to intake manifold

### Diagram of fuel lines

The fuel delivery and return lines are routed on the left-hand underside of the vehicle.



similar to B 230 F

1 = Pressure gauge/pressure tester KDJE P 100/14

2 = Connecting part KDJE-P 100/14

### Fuel pressure test

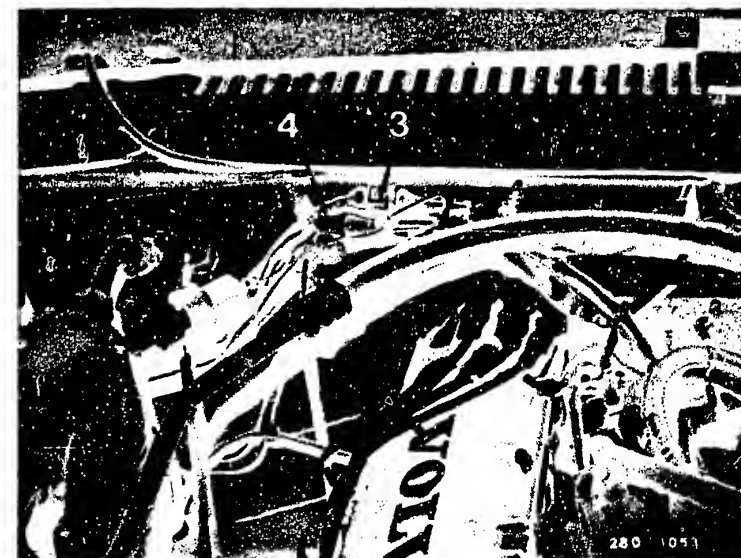
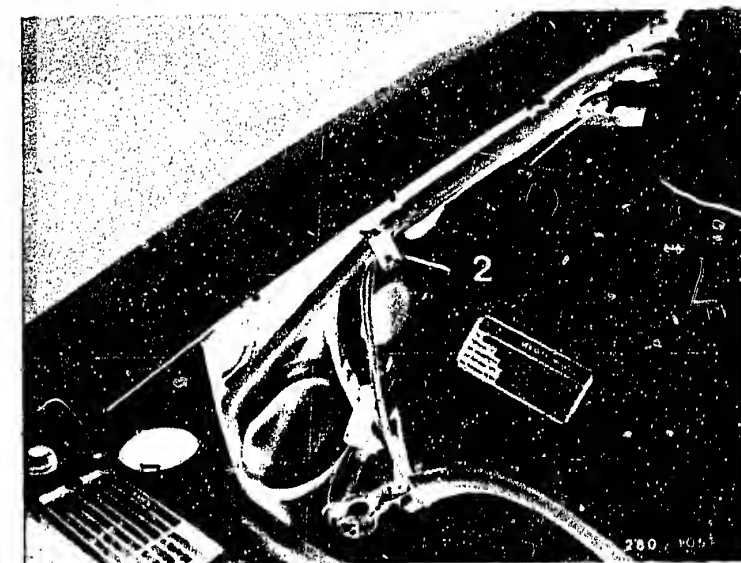
- Connect pressure gauge/pressure tester. Unscrew fuel delivery line from fuel-distribution pipe.  
Caution: When unscrewing the hose, make sure that no fuel gets onto hot parts of the engine.
  - Connect connecting part KDJE-P 100/14 in between.
  - If using pressure tester KDJE-P 100, close the valve screw (only the right-hand one if using KDEP 1034).
- Make sure there are no leaks.

## Installation position of components

- 1 = Control unit
- 2 = Test pin (idle speed control) (red/white) integrator output (green/white)
- 3 = Plug connector for heating (lambda sensor)
- 4 = Lambda sensor plug connector

The control unit is in the front-passenger footwell on the right behind a cover. Pump fuse and main and pump relays in passenger compartment, center console, behind the ashtray (740 GLE, 240 GLE in driver's footwell on left fuses, relays in front-passenger footwell behind the cover)

Test pin (red/white) and integrator output (green/white) are combined in a twin connector (2) center picture in engine compartment on right between battery and shock absorber crown.

**G21**

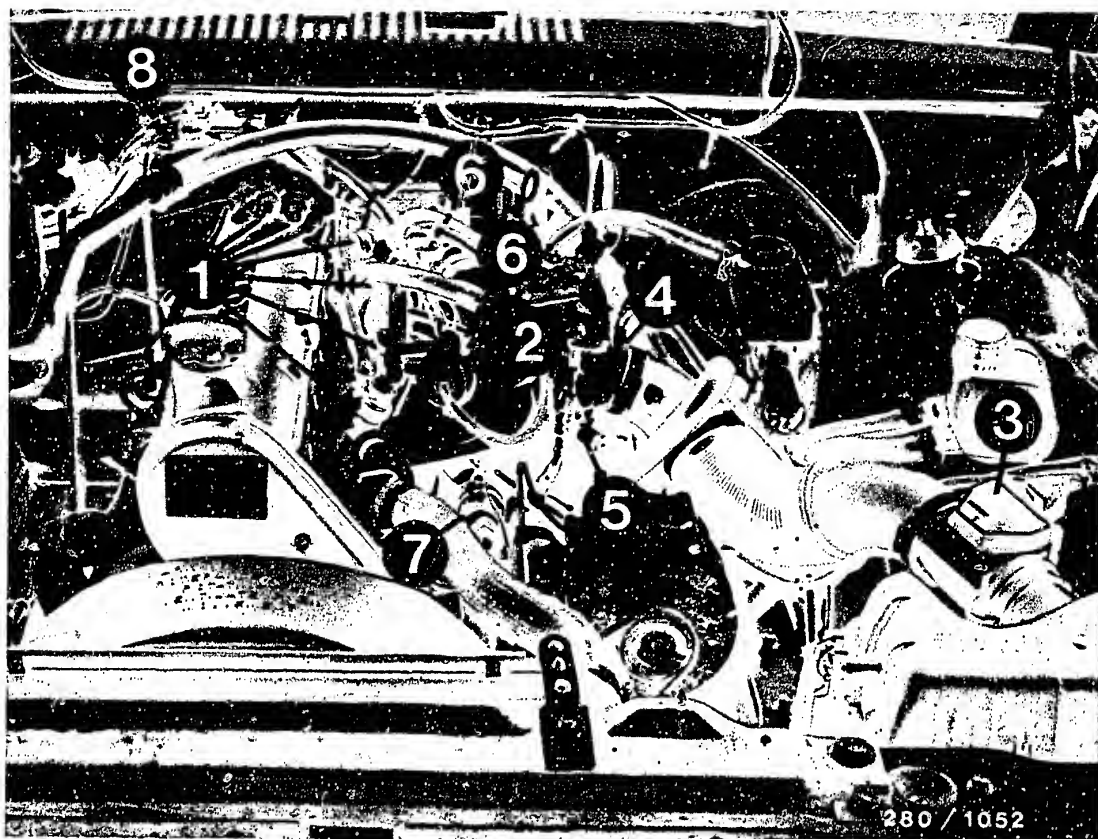
Installation position of components  
Volvo 240/740 GLE

**G22**

Installation position of components  
Volvo 240/740 GLE







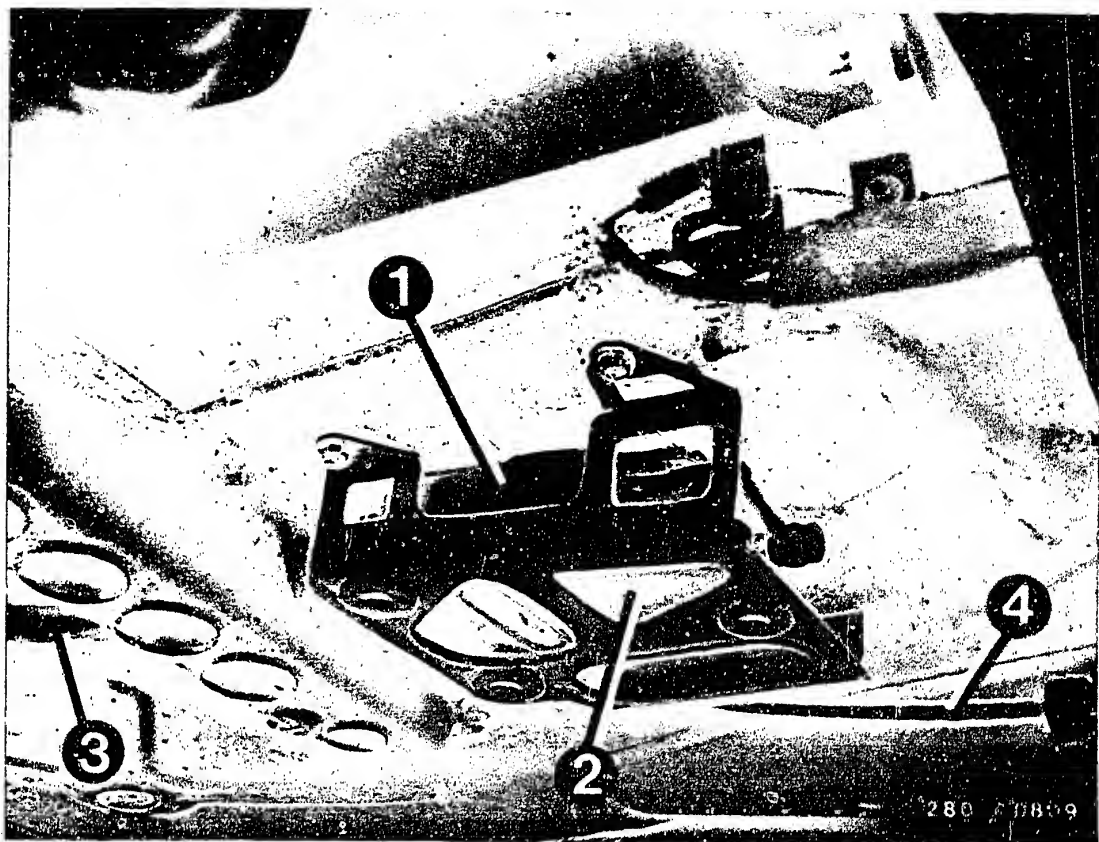
### Installation position of components (continued)

- 1 = Solenoid-operated injection valves
- 2 = Pressure regulator
- 3 = Hot-wire air-mass sensor
- 4 = Throttle-valve switch
- 5 = Adjusting screw for basic engine speed
- 6 = Ground terminals
- 7 = Idle actuator
- 8 = Lambda sensor connector

Temperature sensor is situated between injection valves 3 and 4 under the intake manifold.







similar to B 230 F

- 1 = Electric fuel pump
- 2 = Fuel filter
- 3 = Fuel intake line
- 4 = Fuel delivery line

Pre-supply pump in tank (accessible through the luggage compartment).



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6. General information.....	H 22



This microcard contains the trouble-shooting instructions for the Motronic in the following Volvo models valid at the time of printing:

Volvo 740/760 Turbo with 2.0 l / 4-cyl. engine  
(8.84 →)

Finland and Italy versions

## 1. SPECIAL FEATURES

- Idle speed is controlled by an electronic controller and actuator from BOSCH (no auxiliary-air device).
- The solenoid-operated injection valves are actuated by an external amplifier (fuel-injection output stage) with 4 outputs (1 output per valve). This amplifier is energized from the Motronic control unit (term. 14).

If detailed instructions and information are required, use the similar SIS microcard VOL-511.

## 2. RAPID DIAGNOSIS CHART FOR UNIVERSAL TEST ADAPTER

The following rapid diagnosis chart makes it possible for the experienced Motronic expert to quickly check the electrical part of the system with the universal test adapter.

The rapid diagnosis chart contains the following information:

- Switch positions on universal test adapter
- Sequence of test steps
- Notes on how to operate the universal test adapter or other components
- Readings on multimeter and motortester



# Rapid diagnosis chart for universal test adapter

<u>Test step</u>	<u>Switch position</u>		<u>Remarks</u>	<u>Test specifications (reading)</u>
	V	$\Omega$		
1	↓	1	Shift gear to neutral, ignition off. Disconnect control unit and relay set. Measure insulation resistance of engine-speed sensor. Term 8 against term. 5	<u>Greater than 1M<math>\Omega</math></u>
2	↓	2	Measure insulation resistance of reference-mark sensor. Term. 25 against term. 5	<u>Greater than 1M<math>\Omega</math></u>
3	↓	3	Measure winding resistance of engine-speed sensor. Term. 8 against term. 27	<u>0.6 ... 1.6 k<math>\Omega</math></u>
4	↓	4	Measure winding resistance of reference-mark sensor. Term. 25 against term. 26	<u>0.6 ... 1.6 k<math>\Omega</math></u>
5	↓	5	Measure resistance of engine temperature sensor (NTC II). Term. 13 against term. 5	At + 15°C to + 30°C: <u>1.45 ... 3.3 k<math>\Omega</math></u> (depends on temperature)
6	↓	6	Measure resistance of air temperature sensor (NTC I). Term 22 against term. 5	At + 15°C to + 30°C: <u>1.45 ... 3.3 k<math>\Omega</math></u> (depends on temperature)
7/8	↓	7/8	Deleted	-----
9	↓	9	Measure resistance of double temperature sensor (NTC II - coolant). Term. 13 to term. 5	<u>Less than 10 <math>\Omega</math></u>
10	↓	10	Deleted	-----
11	↓	11	Measure resistance. Ground term. 16 against term. 5	<u>Less than 10 <math>\Omega</math></u>
12	↓	12	Deleted	-----

**H3**

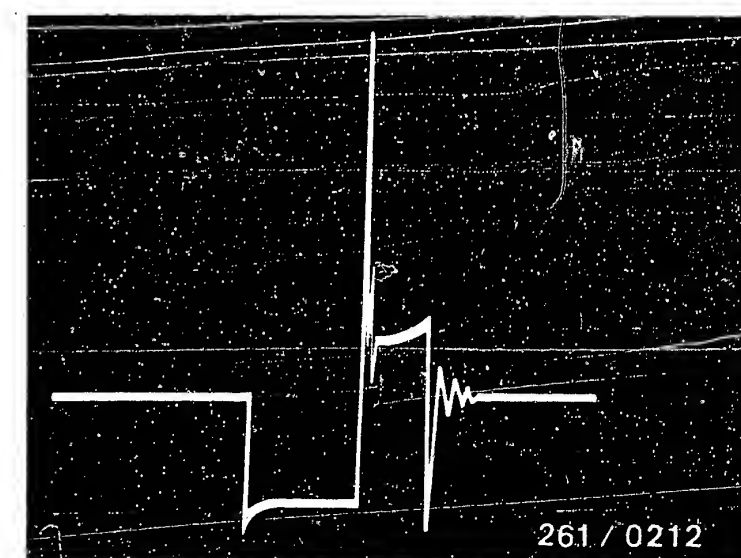
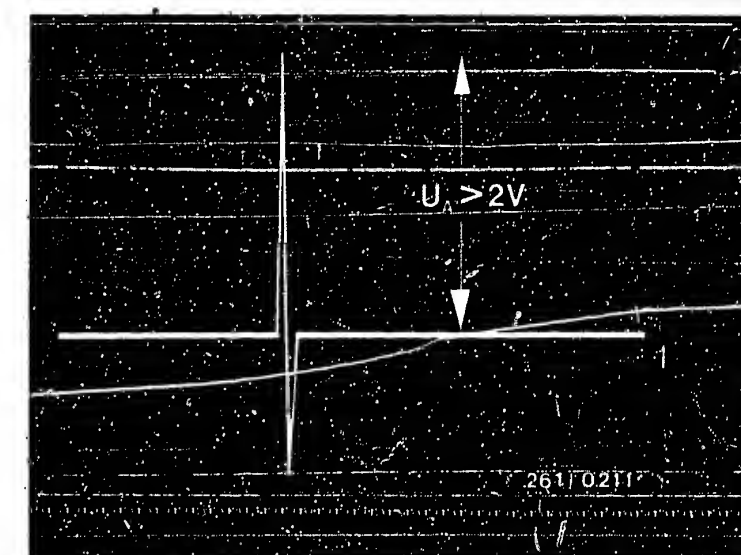
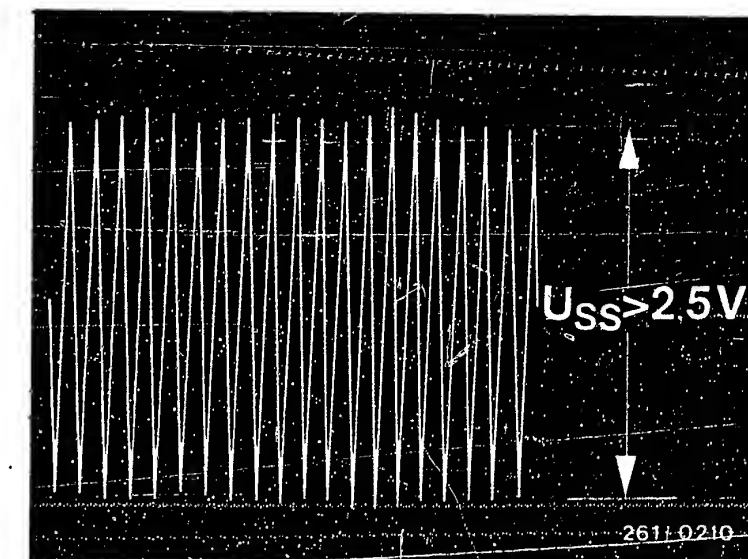
 Rapid diagnosis chart  
Volvo

**H4**

 Rapid diagnosis chart  
Volvo


# Rapid diagnosis chart for universal test adapter (continued)

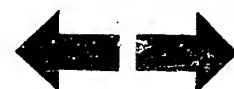
<u>Test step</u>	<u>Switch position</u>		<u>Remarks</u>	<u>Test specifications (reading)</u>
	V	$\Omega$		
13	↓	13	Measure resistance. Ground term. 19 to term. 5	<u>less than 10 <math>\Omega</math></u>
14	↓	14	Measure resistance of charge-air temperature sensor. Term. 30 to term. 5.	at +15°C to 30°C: <u>0.9...1.1k<math>\Omega</math></u> (temperature-dependent)
15	↓	15	Not applicable	----
16	1	15	Check signal with oscilloscope. Engine-speed sensor term. 8 to term. 27. Shift gear to neutral and start.	<u>See top diagram</u>
17	2	15	Check signal with oscilloscope. Reference-mark sensor term. 25 to term. 26. (Positive spike first). Shift gear to neutral and start.	<u>See center diagram</u>
18/19	3/4	15	Not applicable	----
20	6	15	Ignition off. Connect control unit and relay set. Ignition on. Measure power supply to control unit, term. 35 to term. 5.	<u>10...15 V</u>
21	7	15	Check control unit power supply. Term. 18 to term. 5.	<u>10...15 V</u>
22	5	15	Check ignition signal with oscilloscope. Shift gear to neutral and start. Control unit, ignition stage term. 1 to term. 5. Evaluation: signal present.	<u>see bottom diagram</u>



**H5**

Rapid diagnosis chart

Volvo



**H6**

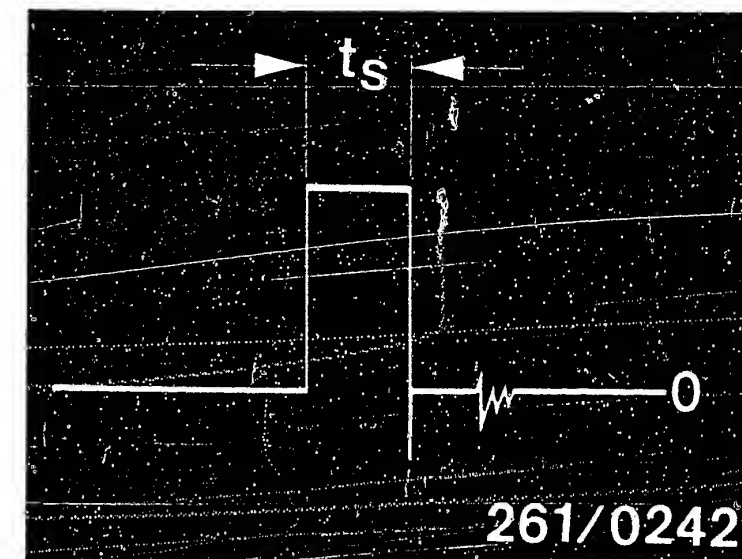
Rapid diagnosis chart

Volvo



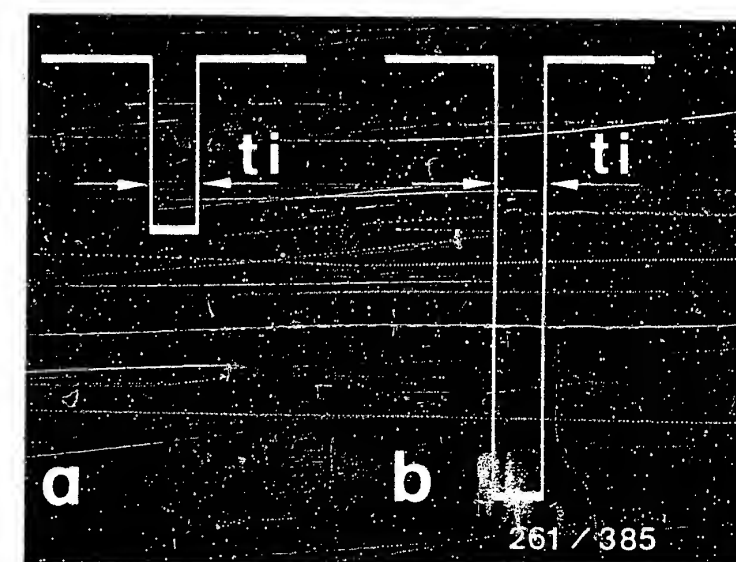
# Rapid diagnosis chart for universal test adapter (continued)

Test step	Switch position	But-ton	Remarks	Test specifications (reading)
	V	$\Omega$		
23	8	15	Measure voltage at control unit. Term. 9 to term. 5	greater than 7 V
24	9	15	Measure voltage at air-flow sensor. Term. 7 to term. 5 Sensor flap in rest position: Sensor flap fully open:	100...250 mV greater than 7 V
25/ 26	10/11	15	Not applicable	----
27	12	15	Measure voltage. Starting signal (term. 50) term. 4 to term. 5	8...15 V
28	13	15	Check dwell-period signal from control unit with oscilloscope. Term. 21 to term. 5. Shift gear to neutral and start.	See top diagram
29	14	15	Check injection signal from control unit with oscilloscope. Term. 14 to term. 5. (Energization of injection output stage). Shift gear to neutral and start.	See bottom diagram (a)
30	14	15	T1 As 29, but duration of injection becomes slightly longer after pressing button (NTC II cold).	
31	15	15	Not applicable	----
32	16	15	Check injection signal $t_i$ from control unit with oscilloscope (measuring output). Term. 11 to term. 5. Shift gear to neutral and start.	See bottom diagram (b)



Dwell-period signal  
 $t_s$  = dwell period

Injection signal  
 $t_i$  = duration of injection



H7

Rapid diagnosis chart

Volvo



H8

Rapid diagnosis chart

Volvo



# Rapid diagnosis chart for universal test adapter (continued)

<u>Test step</u>	<u>Switch position</u>		<u>But-ton</u>	<u>Remarks</u>	<u>Test specifications (reading)</u>
	V	$\Omega$			
33	17	15		Measure voltage at pump relay term. 20 to term. 5. Ignition on.	<u>10 ... 15 V</u>
34	17	15		Measure voltage. Shift gear to neutral and start. Control unit, pump control, active. Term. 20 to term. 5	<u>max. 4 V</u>
35	17	15	T3	Ignition off. Connect pressure gauge. Ignition on. Press button T3. Read off fuel pressure.	<u>2.3 ... 2.7 bar</u>
36	17	15		Check idle speed and CO. Engine at operating temperature; switch off electric devices; diagnosis lead, motortester and CO analyzer connected. Let engine run. Note: If idle speed differs greatly from the specification or if engine hunts at idle, check basic adjustment of idle-speed control.	<u>900 min<sup>-1</sup></u> <u>1.0 ... 2.5 %CO</u> <u>Setting value</u> <u>1.5 %CO</u>
	17	15	T2	As above, values unchanged!	
37	17	15		Check ignition timing at idle speed. Let engine run. <u>Important!</u> Idle speed must be 900 min <sup>-1</sup> ; otherwise different spark-advance angles will be indicated. Switch off air conditioner (if fitted).	<u>10 ... 20° kW</u>
38	17	15		Dwell angle at idle speed	<u>8° ... 15°</u>
				Dwell angle at 3000 min <sup>-1</sup>	<u>30° ... 45°</u>
39	17	15	T5	Keep engine speed constant at 2000 min <sup>-1</sup> . Press button T5. Injection signals stop and, if engine at operating temperature, start again at approx. 1000 min <sup>-1</sup> .	<u>Engine "hunts"</u>

**H9**

Rapid diagnosis chart  
Volvo



**H10**

Rapid diagnosis chart  
Volvo





### 3. TEST SPECIFICATIONS

<u>Idle speed:</u>	<u>900 min<sup>-1</sup></u>
<u>Ignition timing at idle:</u>	<u>15° crankshaft</u>
<u>Exhaust-gas setting</u> <u>CO test specification with</u> <u>engine at op. temp.:</u>	<u>1.0 ... 2.5 vol. % CO</u>
<u>CO setting value:</u>	<u>1.5 vol. % CO</u>
<u>Fuel pressure:</u>	<u>2.3 ... 2.7 bar</u>
<u>Fuel pump delivery:</u>	<u>min. 850 cm<sup>3</sup>/30 s</u>
<u>Pre-supply pump</u>	<u>approx. 935 cm<sup>3</sup>/30s</u>
<u>Injection valve</u> <u>Electrical internal</u> <u>resistance:</u>	<u>2 Ω ... 3 Ω</u>
<u>Series resistor for</u> <u>injection valve</u>	<u>5 Ω ... 7 Ω</u>
<u>Air-flow sensor</u> <u>Resistance between</u> <u>term. 7 and term. 6:</u>	<u>8 Ω ... 2500Ω</u> <u>(Deflect sensor flap)</u>
<u>Term. 9 and term. 6:</u>	<u>500 Ω ... 1100 Ω</u>
<u>Idle actuator</u> <u>Electrical internal</u> <u>resistance:</u>	<u>Term. 3/4: 19 ... 25 Ω</u>
<u>(at +15°...+30°C):</u>	<u>Term. 5/4: 17...22.5 Ω</u>
<u>Charge-air temperature</u> <u>sensor</u> <u>Electrical internal</u> <u>resistance</u>	
<u>at +15°C...+30°C:</u>	<u>900 Ω ... 1100 Ω</u>
<u>at + 80°C:</u>	<u>1230 Ω ... 1370 Ω</u>



Temperature sensor I (NTC I air):

Electrical internal resistance

at +15°C...+30°C: 1.45...3.3 kΩ

measured at air-flow

sensor between term. 22

and term. 6 at +80°C: 280...360 Ω

Temperature sensor II (NTC II coolant):

Double NTC for Motronic and idle-speed control

Electrical internal resistance of each temperature sensor:

At ambient temperature (+15°C...+30°C): 1.45...3.3 kΩ

With engine at op. temp.

(approx. +80°C): 280...360 Ω

Throttle-valve switch

Resistance of idle contact

(term. 2 and ground): 0 Ω

Start valve

Electrical internal

resistance approx. 4 Ω

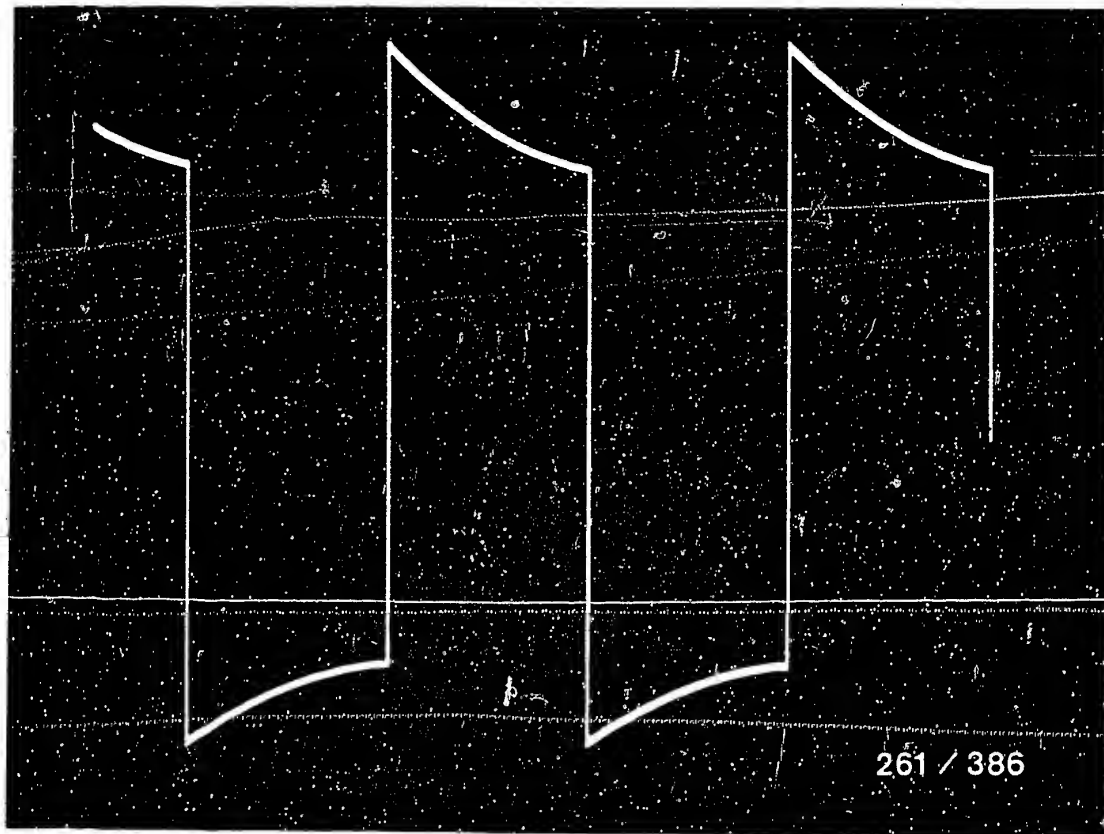
Engine-speed sensor and reference-mark sensor

Electrical internal

resistance: 0.6...1.6 kΩ

<u>Thermo- time switch</u> 35°C/7.5 s	Electrical internal resistance		
	"G" and ground	"W" and ground	"G" and "W"
Ambient temp. (below +30°C):	25...40 Ω	0 Ω	25 ... 40 Ω
Op. temp. (above +40°C):	...80 Ω	100...160 Ω	50...80Ω





Signal at idle actuator

### Checking and basic setting of idle-speed control

- Push back protective rubber cap on plug to actuator and, using test prods with plug connected, check the voltage at term. 3 and 5 to term. 4 with oscilloscope (see diagram).  
If no pulses, check leads to idle controller (terminals 3, 4, 5).
- Record on/off ratio at idle actuator at  $900 \text{ min}^{-1}$  with dwell-angle tester, term. 3/4: 67...77%, term. 5/4: 23...33 % (engine at operating temperature, switch off electrical devices).
- Measure winding resistance of actuator (at  $+15^{\circ}\text{C} \dots +30^{\circ}\text{C}$ ), term. 3/4: 19...25  $\Omega$ ; term. 5/4: 17...22.5  $\Omega$  (to do this, disconnect plug).
- Further trouble-shooting: actuator mechanically defective e.g. rotary slider stiff.



## Checking and basic setting of idle-speed control (continued)

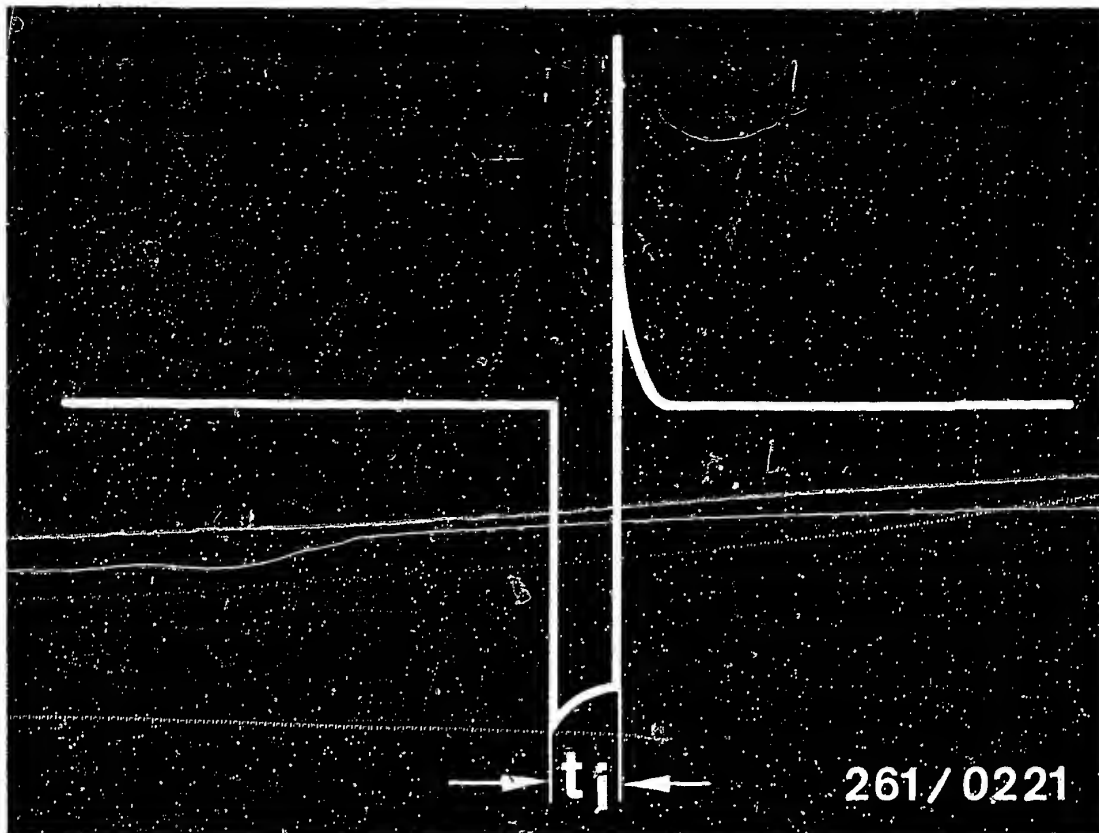
### Idle controller O.K.?

- Dwell-period signal present at term. 12 of controller? Measure with controller connected, directly at back on plug (engine idling)
- Check power supply (10...15 V) at term. 1/2. Switch on ignition.
- Idle contact closing with throttle valve closed?  
- Is there then approx. 0 V at term. 8?
- Check double temperature sensor (NTC II).  
Switch off ignition and disconnect plug to controller. Measure resistance between term. 9 and term. 11 (ground) in plug.
- At +15°C...+30°C: 1.45...3.3 k $\Omega$  (engine cold)  
+80°C: 280...360  $\Omega$  (engine at op. temp.)
- With air conditioner off, there must be no battery voltage at term. 7.

### Basic setting of idle speed

- Run warmed-up engine at idle: switch off all electrical devices and connect test output of idle control to vehicle ground.
- Set engine speed to 800 ... 850 min<sup>-1</sup> at idle-speed-adjusting screw.
- Checking value for on/off ratio 20 ... 30 % (term. 5 of actuator to term. 4).  
Then separate test output from ground.





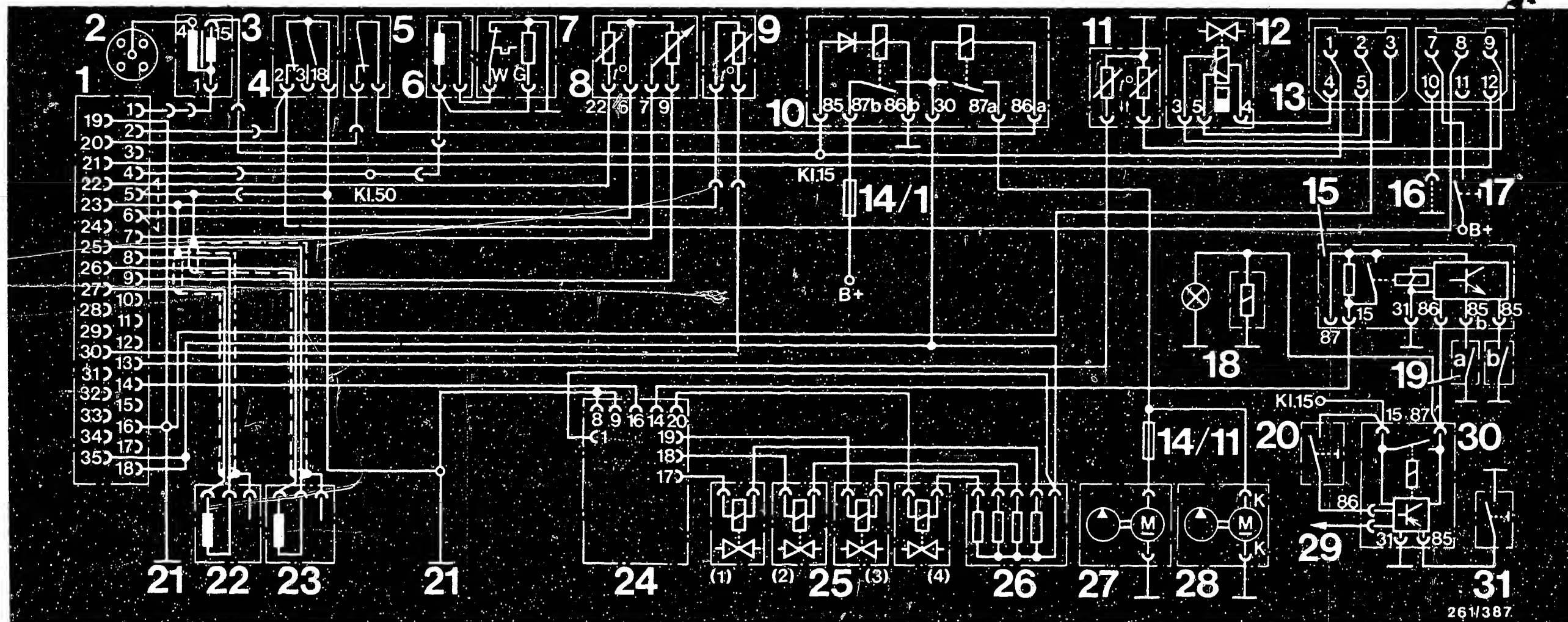
Injection signal at injection valve.

$t_i$  = Duration of injection

#### Checking the external injection output stage

- Start engine and check injection pulses at injection valves with oscilloscope (use test lead 1 684 463 093).
- With ignition off, disconnect 25-pin plug to output stage and check the power supply (ignition on: 10...15 V at term. 1/8).
- Check connection between term. 16 and Motronic term. 14 with ohmmeter (approx. 0  $\Omega$ ).





#### 4. ELECTRICAL TERMINAL DIAGRAM

- |   |   |   |
|---|---|---|
| 1 = Plug to control unit                                    | 11 = Double temperature sensor (NTC II)                                 | 22 = Engine-speed sensor                      |
| 2 = High-voltage distributor                                | 12 = Idle actuator  | 23 = Reference-mark sensor                    |
| 3 = Ignition coil   | 13 = Idle control (11a: test output)                                    | 24 = Injection output stage                   |
| 4 = Throttle-valve switch                                   | 14 = Fuse No. 1 and No. 11  | 25 = (1, 2, 3, 4) injection valves            |
| 5 = Charge-air pressure relief switch<br>(pressure monitor) | 15 = Torque-delay relay   | 26 = Series resistors for injection<br>valves |
| 6 = Start valve   | 17 = Air-conditioner switch, if fitted                                  | 27 = Pre-supply pump                          |
| 7 = Thermo-time switch                                      | 18 = Indicator lamp and solenoid-<br>operated switch for overdrive (OD) | 28 = Electric fuel pump                       |
| 8 = Air-flow sensor with air-temperature<br>sensor (NTC I)  | 19 = Charge-air (a) and oil pressure<br>switches (b)                    | 29 = To speedometer                           |
| 9 = Charge-air temperature sensor                           | 20 = Actuating switch for OD  | 30 = Switching relay for OD                   |
| 10 = Relay set<br>(main and pump relays)                    | 21 = Ground terminals on fuel-distribution<br>pipe                      | 31 = Transmission switch for OD               |

**H 16**

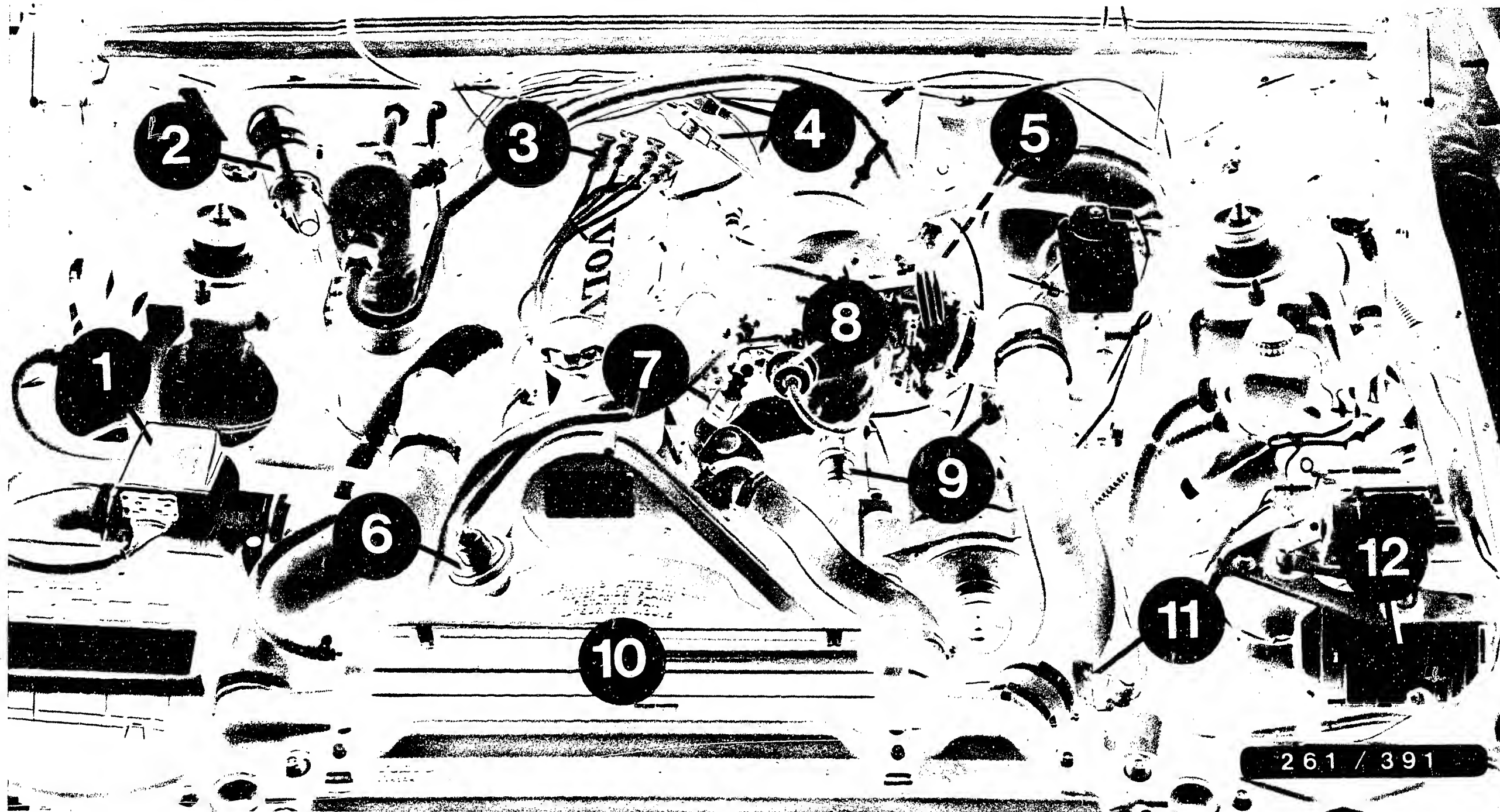
Electrical terminal diagram  
Volvo



**H 17**

Electrical terminal diagram  
Volvo





261 / 391

# 5. INSTALLATION POSITION OF COMPONENTS

- 1 = Air-flow sensor
- 2 = Ignition coil
- 3 = High-voltage distributor
- 4 = Plug connectors for inductive sensors

- 5 = Throttle-valve switch
- 6 = Bypass air valve
- 7 = Injection valve
- 8 = Pressure regulator

- 9 = Idle actuator
- 10 = Charge-air cooler
- 11 = Charge-air temperature sensor
- 12 = Injection output stage

**H18**

Installation position of components  
Volvo



**H19**

Installation position of components  
Volvo





## Installation position of components (continued)

The indications "right" and "left" apply always as viewed in the forward direction of travel. Listed below are the components which are not visible in the picture.

- Reference-mark and engine-speed sensors  
In starting-motor ring gear housing on circumference of flywheel ring gear.
- Fuel filter and fuel pump  
Underneath vehicle (center of vehicle)
- Pre-supply pump  
In tank
- Control unit  
Behind side panel in right-hand footwell.
- Central ground  
Under front fastening screw of fuel-distribution pipe.
- Relay set and fuse board  
In passenger compartment on center console behind ashtray
- Double engine-temperature sensor (NTC II)  
Underneath intake port of cylinder 3.
- Thermo-time switch 35°C/7.5 s  
Underneath intake port of cylinder 4



## Installation position of components (continued)

- Start valve  
On intake manifold (bottom center)
- Wastegate  
Near exhaust-gas turbine.
- Charge-air pressure relief switch and charge-air pressure switch  
Behind instrument panel, above pedals.
- Idle controller  
In passenger compartment (above engine-hood opener).
- Test output for idle-speed basic setting  
On wiring harness. (Near air-flow sensor).
- Series-resistor unit  
(4 series resistors for injection valves):  
In engine component; left-hand inside wall (near injection output stage).



## 6. Important general information

This information must be observed in order to prevent damage to the engine, control unit or ignition coil and for the safety of personnel.

6.1 Never start engine without securely connected battery.

6.2 Incorrect polarity of the supply voltage, e.g. by incorrect connection of the battery or ignition coil, can lead to irreparable damage to the control unit.

6.3 Do not use a fast charger for starting the engine.

Use only a second 12 V battery and jump leads.

Caution! Owing to different requirements of vehicle manufacturers with regard to electronic products we advise you not to use 24 V batteries as an aid for starting. Follow the vehicle owners manual.

6.4 Disconnect the battery from the vehicle electrical system before fast charging.

6.5 When charging the battery in the vehicle or when using a starting aid, follow the information in the operating instructions of the fast charger and also follow the information given by the vehicle manufacturer.

6.6 Never disconnect the battery from the vehicle electrical system with the engine running.

6.7 Do not short-circuit ignition coil term. 1 to ground (e.g. for stopping the engine). The ignition coil and possibly the control unit will suffer irreparable damage.



6.8 Never bring the positive pole of the battery into contact with ignition coil term. 1. The control unit will suffer irreparable damage.

6.9 Never connect or disconnect the wiring-harness plug of the control unit with the ignition switched on.

6.10 Remove the control unit at temperatures above 80°C (paint-drying installation).

6.11 Remove the control unit before performing welding work (electric spot welding).

6.12 Remove the relay combination when performing a compression test. This prevents undesired injecting of the injection valves.

6.13 If installing an alarm system, follow the installation instructions for Motronic vehicles or microfiche ALL-500.

It must be ensured that the alarm relay does not suffer interference from stray fields (e.g. from H.T. ignition cables), causing it to trip incorrectly.



CAUTION!

High-energy ignition  
system.  
Dangerous primary and  
secondary voltages.



The above sticker has the following meaning:

The Motronic contains a high-performance ignition system which can be dangerous if live parts or terminals are touched (both on the primary as well as secondary sides).

In this connection we should like to point out that the relevant legal regulations concerning work on electrical installations must be observed when testing or working on the ignition system.

The ignition must always be switched off when working on the ignition coil (switch off ignition/voltage source). Such work includes:

- Connection of engine testers (timing light, dwell-tach tester, ignition oscilloscope etc).
- Replacement of parts of the ignition system (spark plug, ignition coil, ignition distributor, ignition cable etc).

If, when testing the ignition system or when performing adjustments on the engine (e.g. carburetor), it is necessary to switch on the ignition (switch on ignition/voltage source), the above-mentioned dangerous voltages occur over the entire system.

There is, therefore, danger of accident not only on the individual components of the ignition system (e.g. ignition distributor; ignition coil, trigger box, ignition harness), but also on the wiring harness (e.g. tachometer connection, diagnostic plug), on plug-in connections and on testers.



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4. Fuel-line diagram ..... J 12
5. General safety information ..... J 14
6. Installation position of  
individual components ..... J 15



## 1. Special features

● This microcard contains the K-Jetronic trouble-shooting instructions for the following Volvo models valid at the time of writing:

Volvo 240/740 with

Engine B 200 E, 1.9 ltr./4 cyl.

09.84 →

Engine B 230 E, 2.3 ltr./4 cyl.

08.84 →

- In-tank pre-supply pump
- Updraft mixture-control unit
- Vehicles of the Sweden, Switzerland, and Australia versions are equipped with exhaust-gas recirculation and secondary air injection.
- Temperature switch +45°C for exhaust-gas recirculation

Basic microcard for detailed trouble-shooting:  
VOL 01/J2

Important: When referring to a basic microcard, note that test specifications must always be taken from the vehicle-specific Brief instructions.

**J2**

Special features

Volvo





## 2. Test specifications

### Test step

#### 2.1 Electric fuel pump

0 580 254 948

0 580 254 949

- Delivery quantity: at least 950 cm<sup>3</sup>/30 sec.
- Terminal voltage: at least 11.5 V under loading

#### 2.2 Control-pressure circuit delivery quantity:

- Delivery quantity: 160 ... 240 cm<sup>3</sup>/min.

#### 2.3 Fuel distributor

0 438 100 053

● System pressure*	Test specification:	Setting value:
	4.5 ... 5.2 bar (4.6 ... 5.3 kp/cm <sup>2</sup> )	4.7 ... 4.9 bar (4.8 ... 5.0 kp/cm <sup>2</sup> )

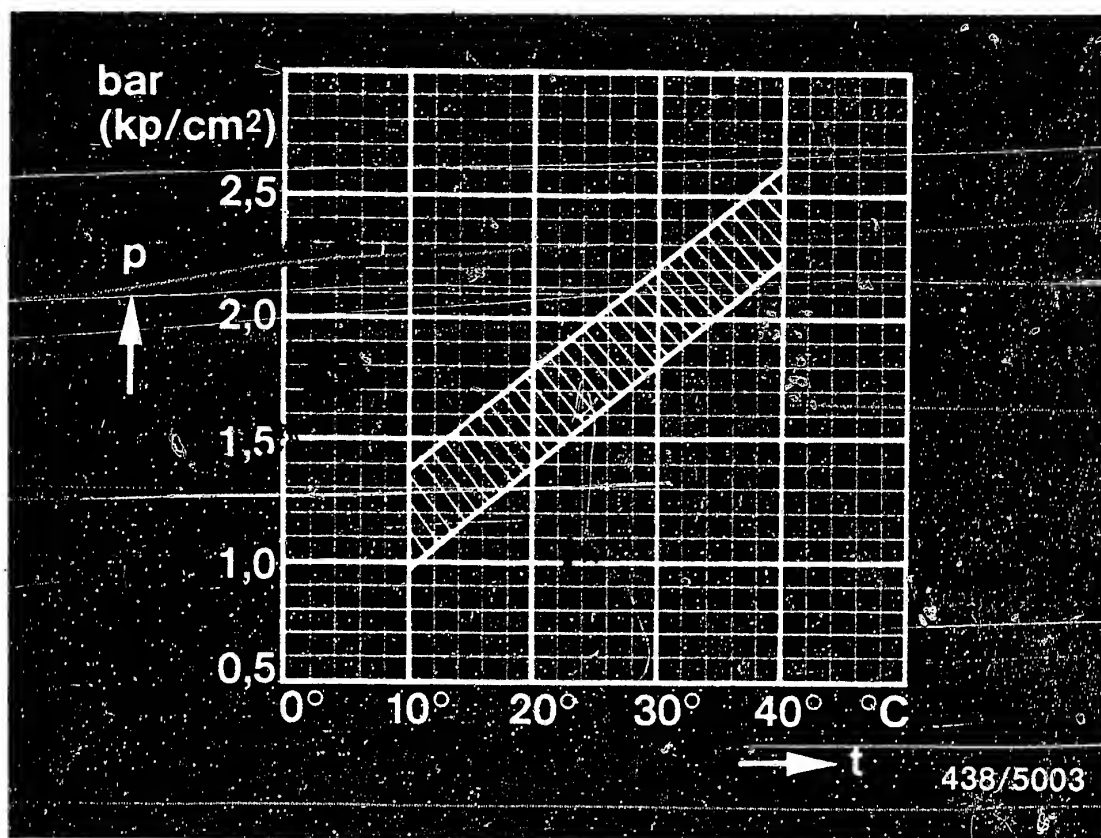
\* Gauge pressure

**J3**

Test specifications

Volvo





p = Control pressure (guage pressure)  
t = Ambient temperature

#### 2.4 Control pressure "cold"

- Warm-up regulator 0 438 140 004



## Test step

### 2.5 Control pressure "warm"\*

Warm-up regulator

0 438 140 004

3.4 ... 3.8 bar  
(3.5 ... 3.9 kp/cm<sup>2</sup>)

### 2.6 Fuel accumulator 0 438 170 001

#### ● Leakage test

Minimum pressure\*: after 10 min.

after 20 min.

1.9 bar  
(2.0 kp/cm<sup>2</sup>)

1.7 bar  
(1.8 kp/cm<sup>2</sup>)

### 2.7 Injection valve 0 438 502 015

#### ● Opening pressure\*:

3.0 ... 4.1 bar  
(3.1 ... 4.2 kp/cm<sup>2</sup>)

#### ● Leakage test

Not below 2.8 bar:\*

No drop must form during 25 sec.

\* Gauge pressure



## Test step

### 2.8 Fuel distributor 0 438 100 053

#### ● Delivery quantity comparison:

Setting point		Max. allowable delivery quantity
Idle	6.0 cm <sup>3</sup> /min.	6.8 cm <sup>3</sup> /min.
Part load	40.0 cm <sup>3</sup> /min.	43.0 cm <sup>3</sup> /min.
Full load	160.0 cm <sup>3</sup> /min.	175.0 cm <sup>3</sup> /min.
At least this quantity must be attained at every outlet.		

### 2.9 Thermo-time switch (non-Bosch product)

#### ● Resistance test between

At temperature under      over °C          °C	Term. "G" and "ground" (housing)	Term. "W" and "ground" (housing)	Term. "G" and term. "W"
+30	25 ... 40 Ω	0 Ω	25 ... 40 Ω
+40	50 ... 80 Ω	100 ... 160 Ω	50 ... 80 Ω



## Test step

### 2.10 Idle setting\*

- Idle speed: 900 min<sup>-1</sup>
- CO content\*\*:
  - Checking value: 0.5 ... 2.0 Vol. -%
  - Setting value: 1.0 Vol-%

\* Vehicles with the B 230 E engine of the Switzerland, Sweden, and Australia versions are equipped with exhaust-gas recirculation (for afterburning of the exhaust gas) and "Puls-air" system (secondary air injection in the exhaust system).

For checking and adjusting the idle speed, both systems must be rendered inoperative as follows:

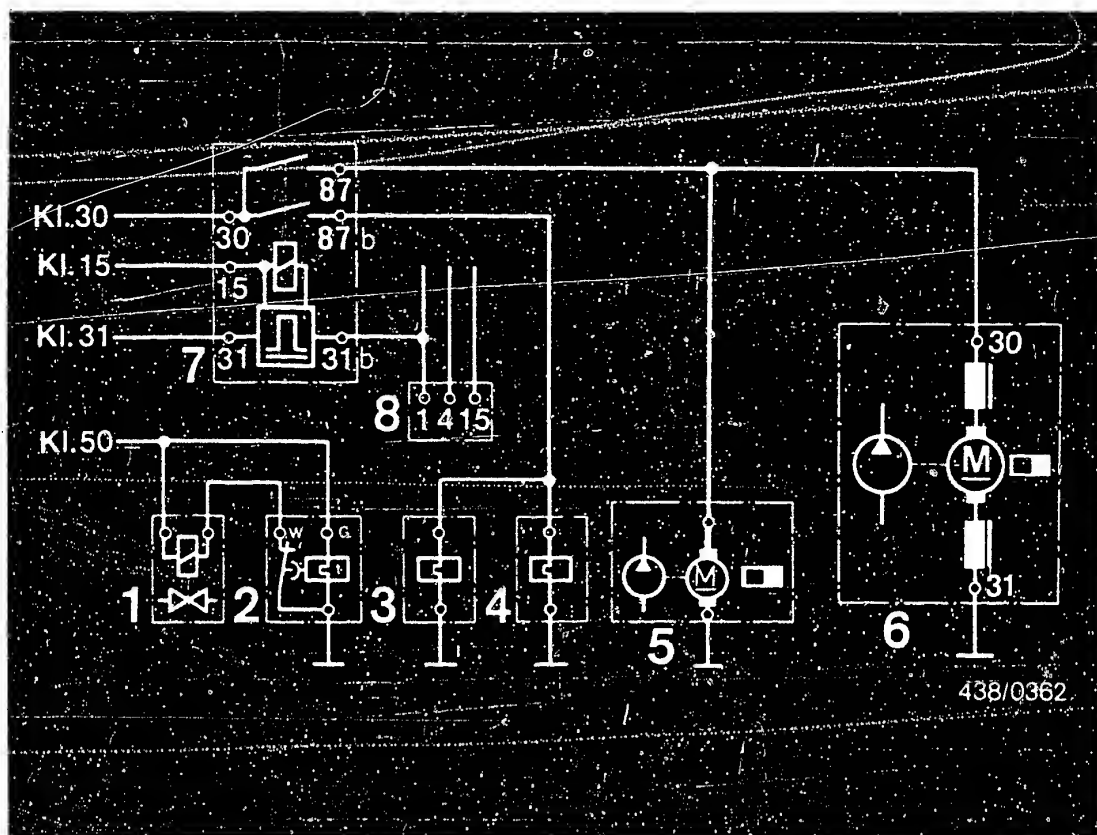
Exhaust-gas recirculation: Remove the vacuum hose from the exhaust-gas recirculation valve and seal off tightly with a plug.

Puls-air system: Remove the hose line from the air filter to the double valve fitting at the air filter and seal off tightly with a plug.

\*\* Readjust CO according to "setting value".

Engines whose CO value is within the checking value tolerance need not be readjusted if otherwise idling smoothly.





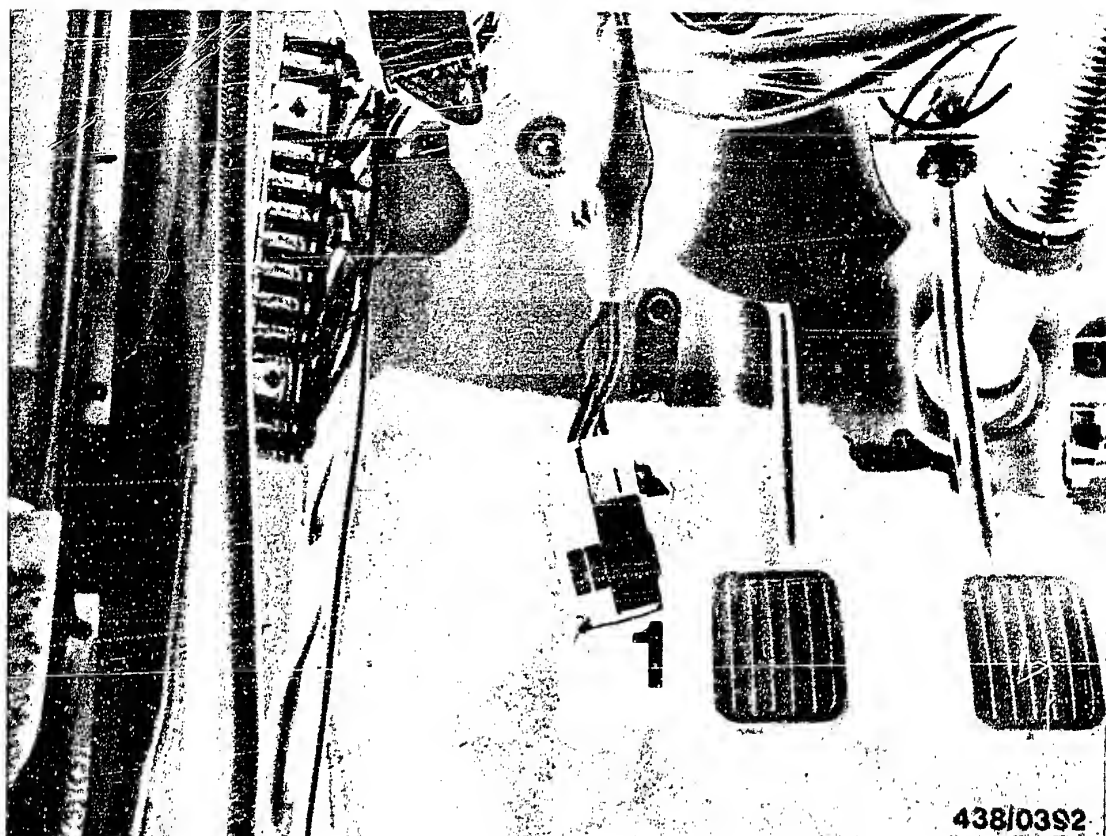
### 3. Electrical safety circuit

The safety circuit employs an electronic relay, which is triggered from terminal 1 of the ignition coil.

#### 3.1 Circuit diagram

- 1 = Start valve
- 2 = Thermo-time switch
- 3 = Warm-up regulator
- 4 = Auxiliary-air device
- 5 = Fuel pre-supply pump
- 6 = Electric fuel pump
- 7 = Electronic speed switch
- 8 = Ignition coil



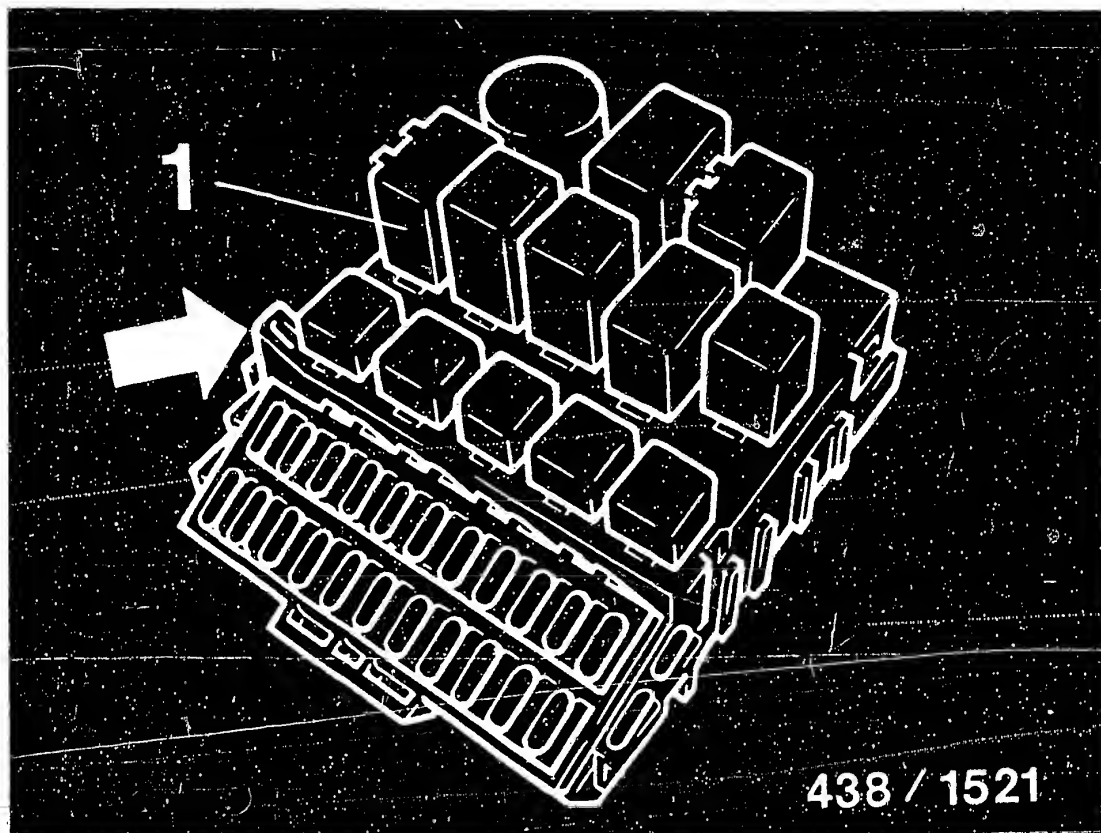


### 3.2 Bridging the safety circuit

In order to carry out testing with the engine off, the safety circuit must be bridged. On the Volvo 240, the relay (1) is fastened to a bracket on the left next to the steering column underneath the dashboard (illustration shows relay removed from bracket). Remove the relay in order to bridge the safety circuit. The relay is made accessible by removing the left underside panel of the dashboard and the left side panel in the footwell.







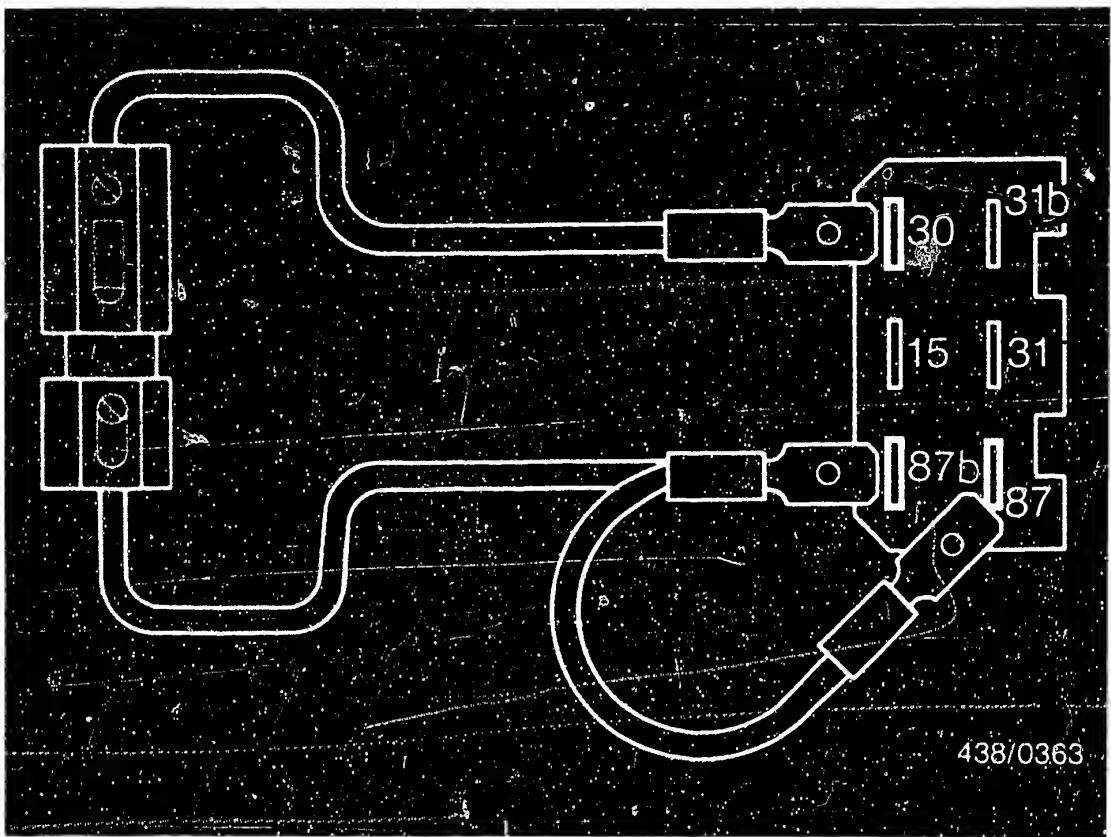
438 / 1521

1 = Electronic speed switch (pump relay)

On the Volvo 740, the electronic speed switch is located in the central electrics console. The console is accessed by removing the ashtray in the center console.

The console with fuse component can be pulled out of the center console after pressing the side detents.



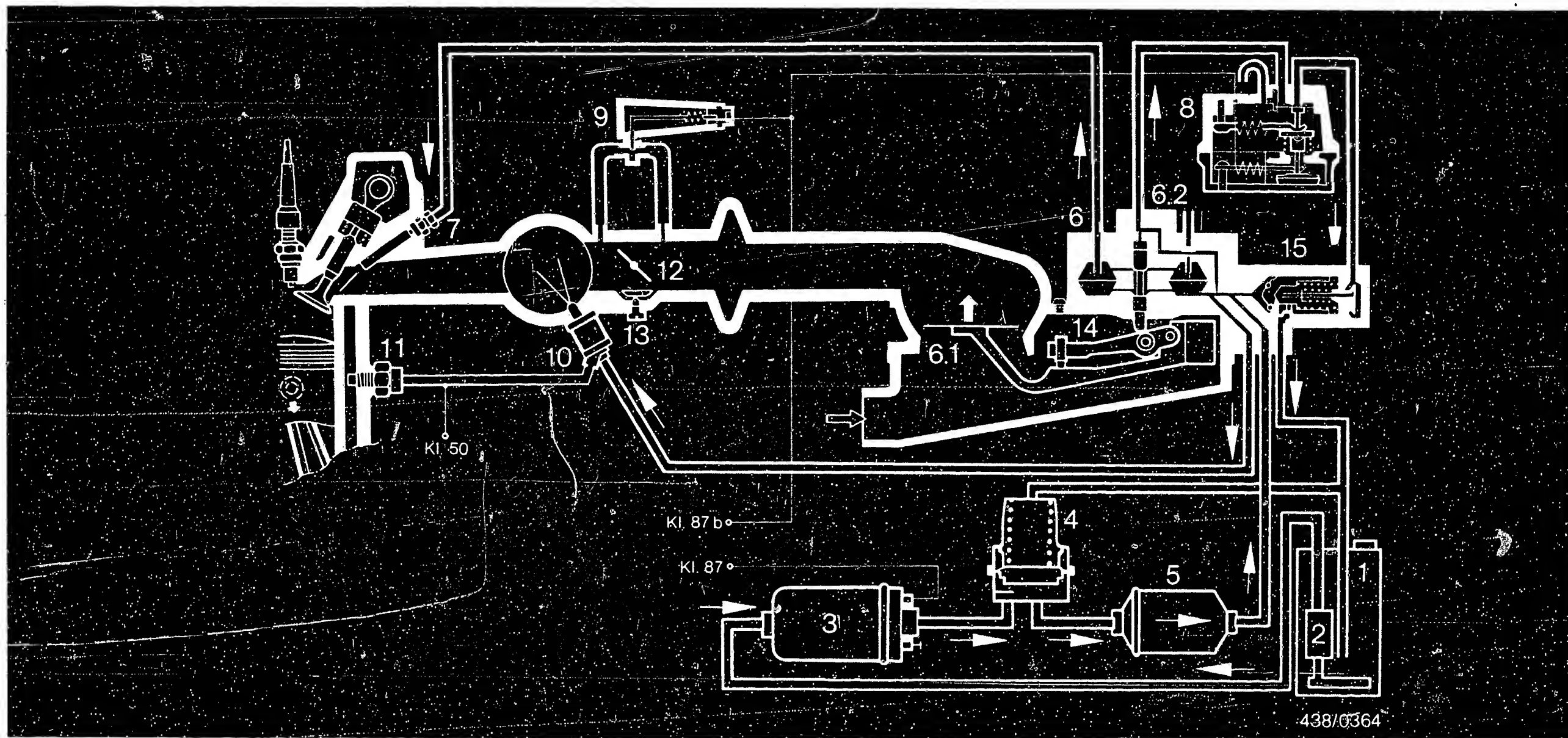


Connect contacts 87 and 87b with contact 30 in the plug base using a double bridge.  
Use a 1.5 mm<sup>2</sup> connecting cable with fuse holder and 16 A fuse.

The electric fuel pump, pre-supply pump, warm-up regulator, and auxiliary-air device are now supplied with battery voltage.

**Caution!**

Never deflect (lift) the air-flow sensor plate while the electric fuel pump is running, as this will cause fuel to be injected through the injection valves. Subsequent starting-motor actuation can lead to extremely serious damage to the engine.



#### 4. Fuel-line diagram

1 = Fuel tank  
2 = Pre-supply pump  
3 = Electric fuel pump  
4 = Fuel accumulator  
5 = Fuel filter  
6 = Mixture-control unit

6.1 = Air-flow sensor  
6.2 = Fuel distributor  
7 = Injection valve  
8 = Warm-up regulator  
9 = Auxiliary-air device  
10 = Start valve

11 = Thermo-time switch  
12 = Throttle valve  
13 = Idle-speed-adjusting screw (bypass)  
14 = Idle-mixture-adjusting screw  
15 = Primary-pressure regulator with push valve

**J12**

Fuel-line diagram  
Volvo



**J13**

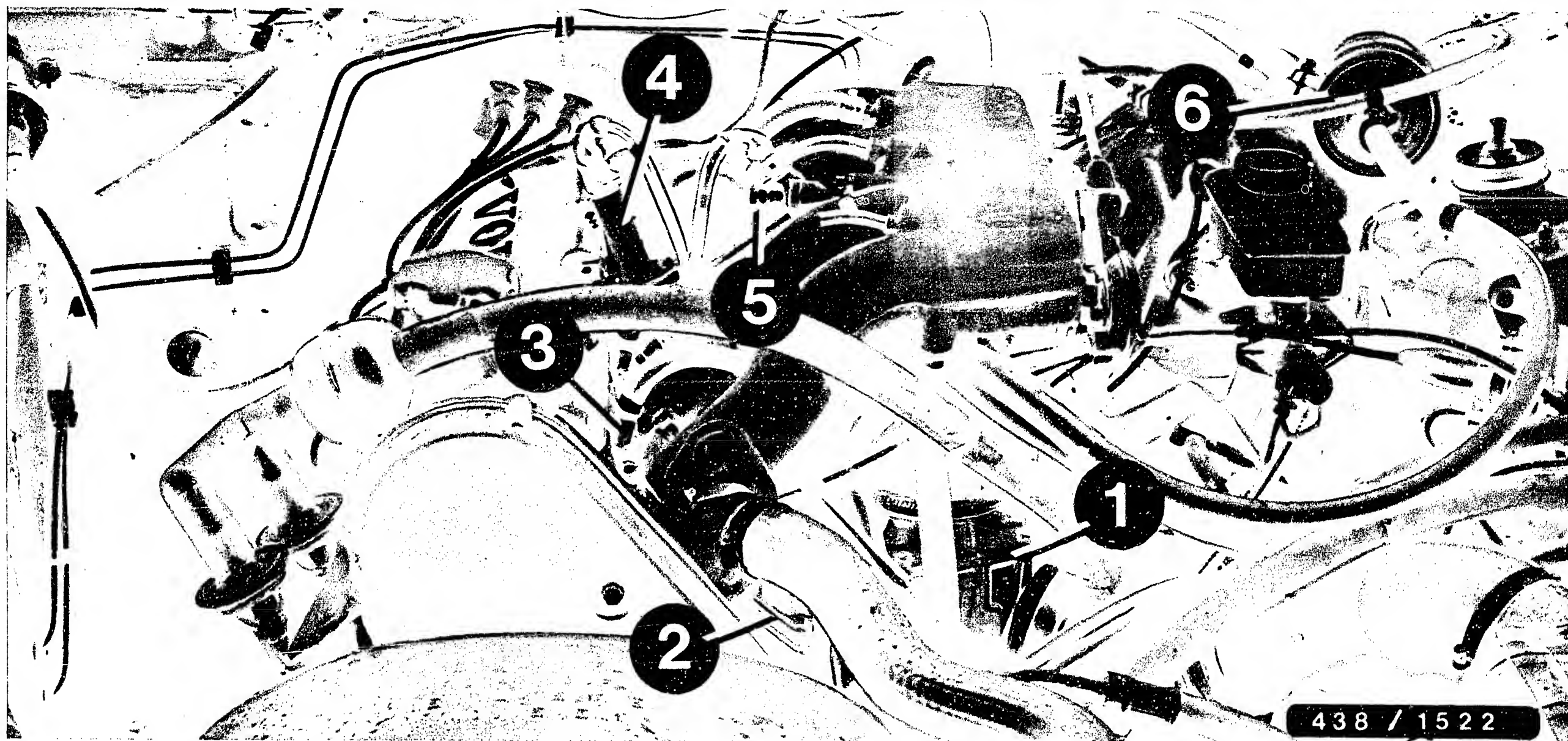
Fuel-line diagram  
Volvo



## 5. General safety information for working on K-Jetronic

- Never deflect (lift) the air-flow sensor plate while the electric field pump is running, as this will cause fuel to be injected through the injection valves.  
Subsequent actuation of the starting motor can lead to extremely serious damage to the engine.
- When testing the injection valves with the valve tester, observe the test medium specification. Never use normal gasoline or similar easily-inflammable liquids for testing.  
Even with calibrating fluid, observe local safety regulations.
- Carry out leakage testing of the induction system only with an approved leak-detector spray (i.e. Gypoflex).  
Use no easily-inflammable liquids. Observe local safety regulations.





438 / 1522

## 6. Installation position of components

### 6.1 Arrangement of components in engine compartment

- |  |                          |
|--|--------------------------|
| 1 = Mixture-control unit                         | 4 = Auxiliary-air device |
| 2 = Warm-up regulator<br>(concealed)             | 5 = Start valve          |
| 3 = Injection valves (cyl. 1<br>in illustration) | 6 = Fuel filter          |

**J15**

Installation position of components

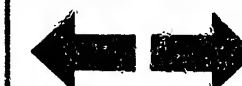
Volvo

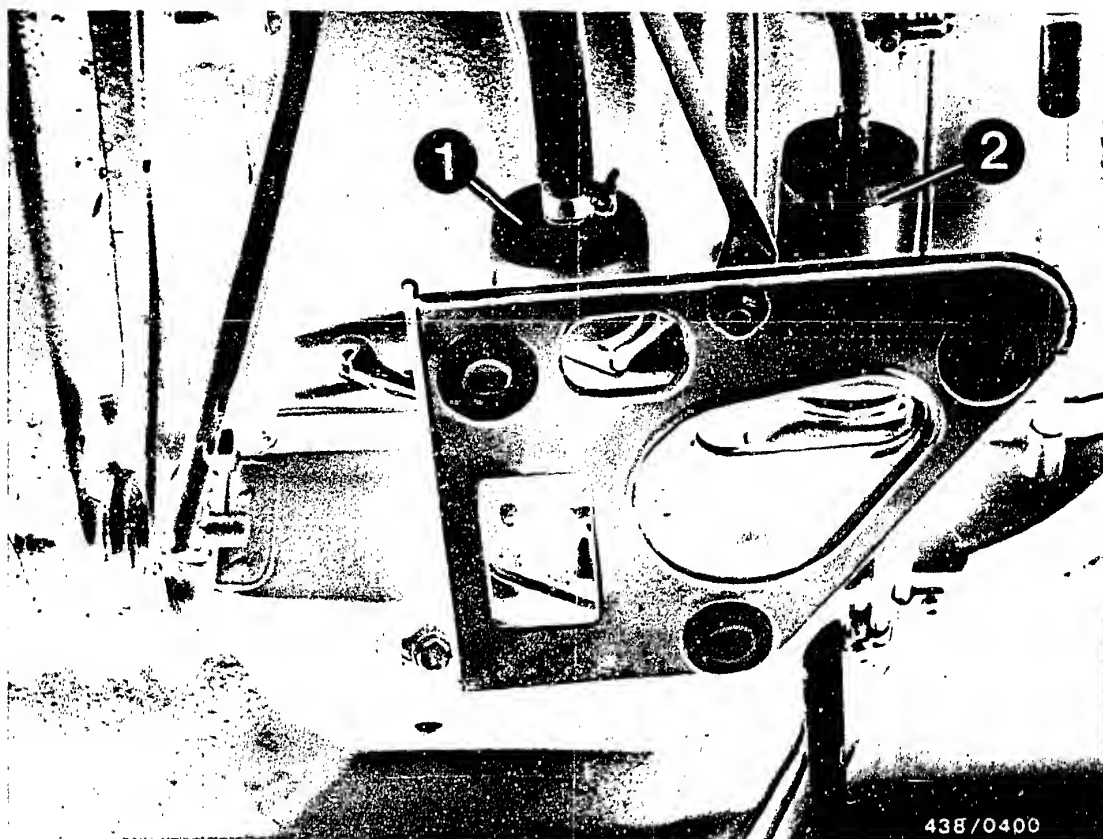


**J16**

Installation position of components

Volvo



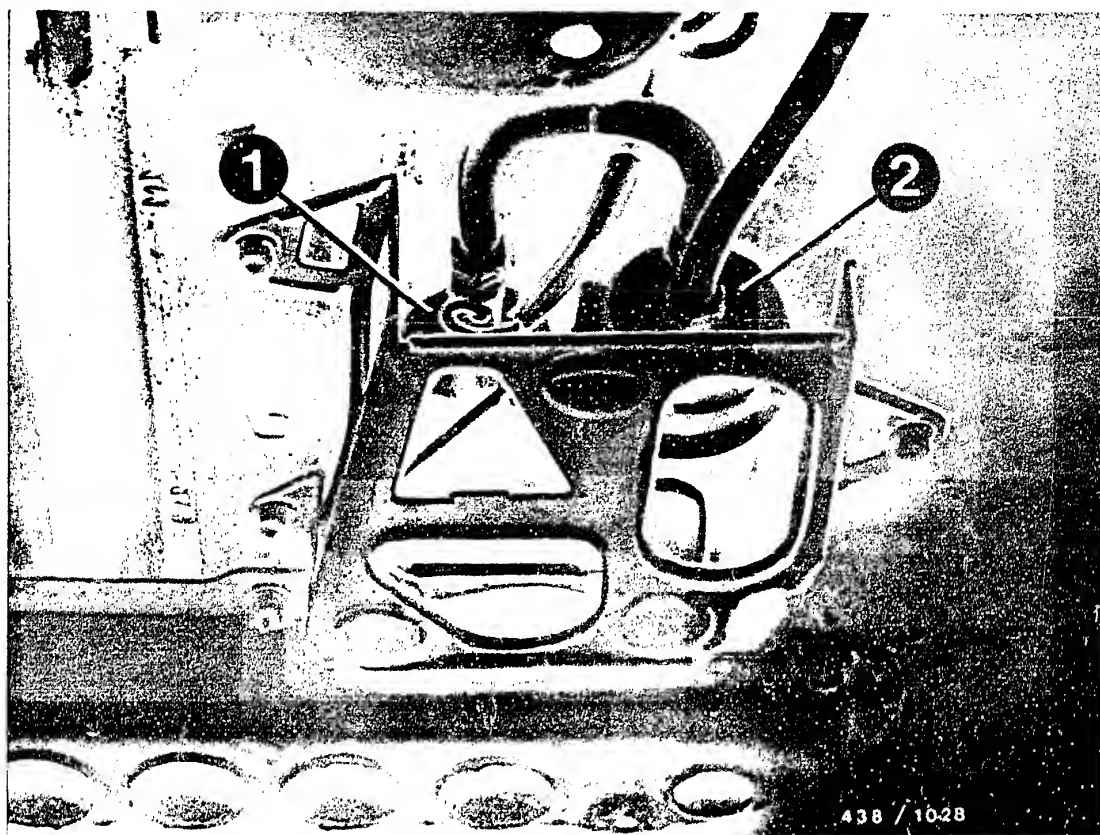


## 6.2 Fuel-supply components

In the Volvo 240, a bracket is located on the vehicle floor (on the left as viewed in direction of travel) in front of the rear axle. The electric fuel pump (1) and the fuel accumulator (2) are mounted on this bracket.







In the Volvo 740, the electric fuel pump and fuel accumulator are located on a single bracket underneath the floor of the vehicle, in the area below the driver's seat.





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### Section

### Coordinates

1. Test specifications..... K 2 - K 6
2. Electric safety circuit... .. K 7 - K 9
3. Fuel line diagram..... K 10 - K 11
4. General safety instructions..... K 12
5. Special features:
  - Injection valves with fixed air guide  
cap..... K 13
  - Pressure jump switch..... K 13
  - In-tank electric fuel pump..... K 14
6. Installation position for individual  
components..... K 15 - K 19



## 1. TEST SPECIFICATIONS

<u>Test step</u>	<u>Test specifications*</u>	
<u>1.1 Electric fuel pump</u>	<ul style="list-style-type: none"> <li>Fuel delivery: min. 800 cm<sup>3</sup>/30 s</li> <li>Terminal voltage: min. 11.5 V under load</li> </ul>	
<u>1.2 Fuel distributor</u>	0 438 100 125 0 438 100 126	
<ul style="list-style-type: none"> <li>Primary pressure</li> </ul>	<u>Test specifications</u> 4.7...5.4 bar (4.8...5.5 kgf/cm <sup>2</sup> )	<u>Setting values:</u> 4.9...5.1 bar (5.0...5.2 kgf/cm <sup>2</sup> )

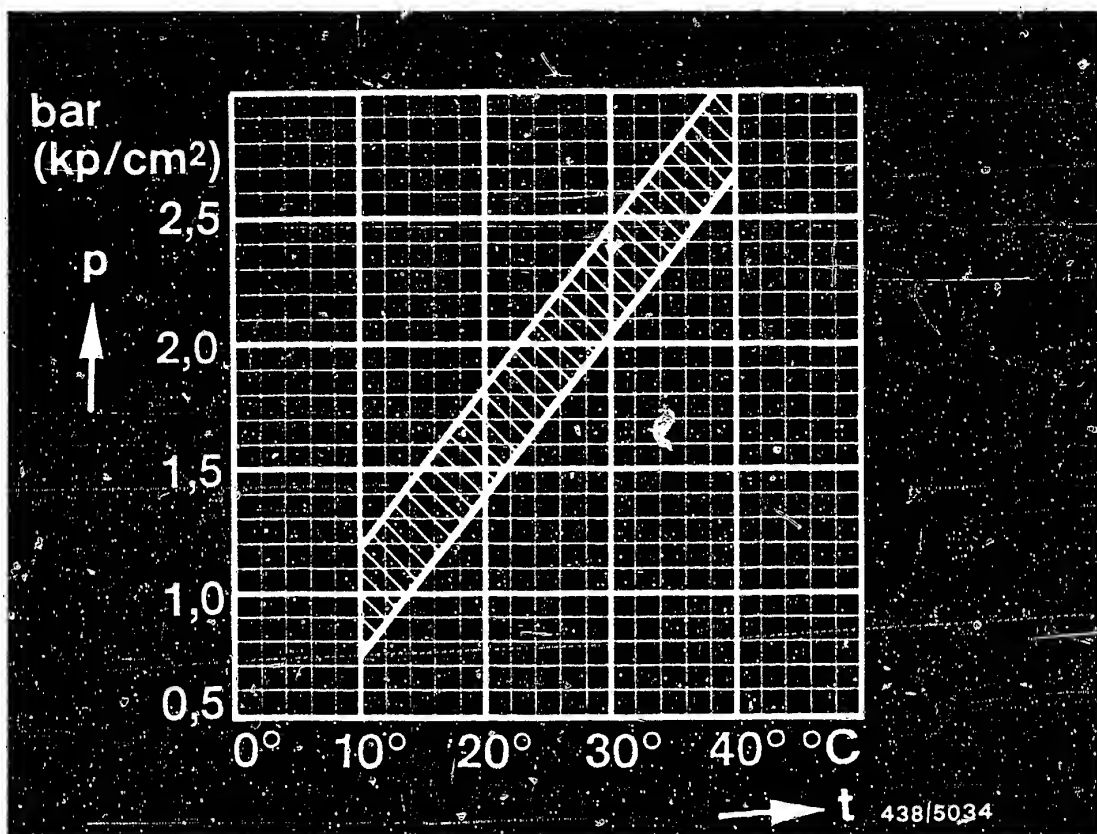
\* Pressures in test specifications table are given in bar (gauge pressure) and/or in kgf/cm<sup>2</sup> (gauge pressure).

**K2**

Test specifications

Audi 80, VW-Passat/Santana





p = Control pressure ( gauge pressure)

t = Ambient temperature

### 1.3 Warm-up regulator

0 438 140 113

0 438 140 114

- Fuel delivery for the control pressure circuit: 160...240 cm<sup>3</sup>/min

### • Control pressure "cold"

(Version for intake-manifold-pressure-controlled full-load enrichment).

For testing, connect vacuum pump to intake-manifold-pressure-connection of warm-up regulator.

Setting value: 400 ... 600 mbar  
(300 ... 450 mmHg)

**K3**

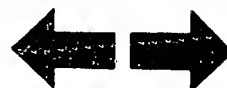
Test specifications

Audi 80, VW-Passat/Santana



<u>Test step</u>	<u>Test specifications*</u>
<ul style="list-style-type: none"> <li>● <u>Control pressure "warm"</u></li> <li>● Test at atmospheric pressure (without vacuum):</li> </ul>	2.7...3.1 bar (2.8...3.2 kgf/cm <sup>2</sup> )
<ul style="list-style-type: none"> <li>● For testing, connect vacuum pump to intake-manifold-pressure-connection of warm-up regulator.</li> </ul> Setting value, 400 ... 600 mbar (300 ... 450 mmHg)	4.0...4.4 bar (4.1...4.5 kgf/cm <sup>2</sup> )
<ul style="list-style-type: none"> <li>● <u>Leak test on full-load diaphragm</u></li> </ul> Setting value, 400 ... 600 mbar (300 ... 450 mmHg):  Maximum permissible pressure drop from setting value:	100 mbar (75 mmHg) / 15 s

\*Pressures in test specifications table are given in bar (gauge pressure) and/or in kgf/m<sup>2</sup> (gauge pressure).



<u>Test step</u>		<u>Test specifications*</u>	
<u>1.4 Fuel accumulator</u>		0 438 170 040 0 438 170 041	
● Leak test Minimum pressure:		After 10 min.	After 20 min.
		2.5 bar (2.6 kgf/cm <sup>2</sup> )	2.4 bar (2.5 kgf/cm <sup>2</sup> )
<u>1.5 Injection valve</u>		0 437 502 026 0 437 502 027	
● Opening pressure:		3.0...4.1 bar (3.1...4.2 kgf/cm <sup>2</sup> )	
● Leak test, not below 2.8 bar:		No dripping may take place within 20 s.	
<u>1.6 Fuel distributor</u>		0 438 100 125 0 438 100 126	
● Comparative measure- ment of deliveries:			
		Setting point	Maximum allowable delivery
Idle		6.0 cm <sup>3</sup> /min.	6.6 cm <sup>3</sup> /min.
Part load		40.0 cm <sup>3</sup> /min.	43.0 cm <sup>3</sup> /min.
Full load		118.0 cm <sup>3</sup> /min.	130.0 cm <sup>3</sup> /min.
This delivery must be at least achieved at every out- let.			

\*Pressures in test specifications table are given in bar ( gauge pressure) and/or in kgf/cm<sup>2</sup> (gauge pressure).

**K5**

Test specifications

Audi 80, VW-Passat/Santana



### 1.7 Thermo-time switch

0 280 130 214

0 280 130 223

#### ● Resistance test between

at temperature below    above	Term. "G" and "Ground" (housing)	Term. "W" and "Ground" (housing)	Term. "G" and term. "W"
+30°C	25...40Ω	0Ω	25...40Ω
+40°C	50...80Ω	100...160Ω	50...80Ω

### 1.8 Idle fine adjustment \*

- Idle speed 800...900 min<sup>-1</sup>
- CO-concentration 0.5...1.5 vol. % CO

#### \* For checking/setting the idle adjustment:

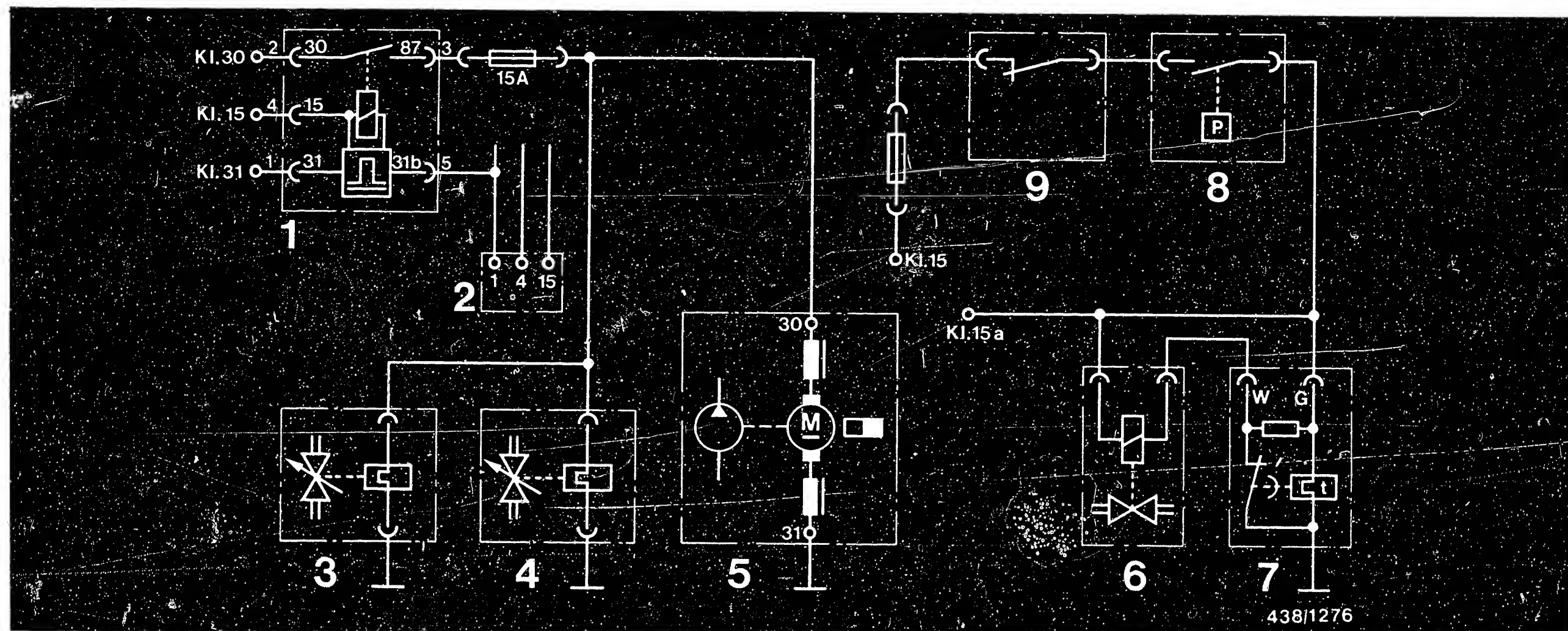
Switch on upper beam, switch off air conditioner.  
Engine at normal operating temperature. Radiator fan  
must not operate while adjusting. Exhaust gas re-  
circulation (if fitted) must be rendered inoperative.  
Remove crankcase breather hose from cylinder head  
cover and seal off end of hose.

**K6**

Test specifications

Audi 80, VW-Passat/Santana





## 2. ELECTRIC SAFETY CIRCUIT WITH ACCELERATION ENRICHMENT

### 2.1 Circuit diagram

1 = Electronic relay  
2 = Ignition coil  
3 = Warm-up regulator

4 = Auxiliary air device  
5 = Electric fuel pump  
6 = Start valve

7 = Thermo-time switch  
8 = Pressure jump switch  
9 = Throttle valve switch

- The safety circuit with electronic relay is controlled from terminal 1 on the ignition coil.
- Acceleration enrichment below 35°C by start valve, released by pressure jump switch and throttle valve idle switch.

**K7**

Electric safety circuit  
Audi 80, VW-Passat/Santana

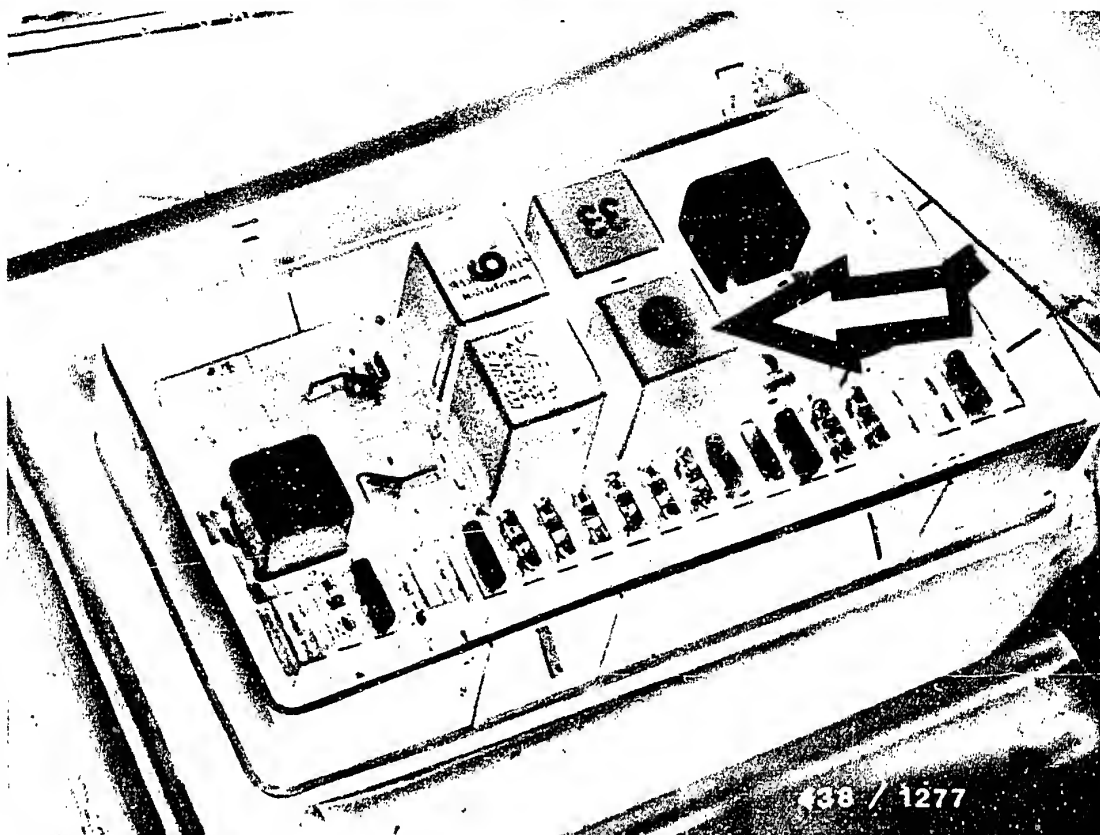


**K8**

Electric safety circuit  
Audi 80, VW-Passat/Santana







Arrow = Electronic relay in the central electrics console

## 2.2 Bridge safety circuit for test work.

To do this, remove electronic relay from relay board. Connect contacts 30 and 87 with a connector cable. Use connector cable 1.5 mm<sup>2</sup> with fuse holder and 16 A fuse. Breadth of tab: 9.5 mm

Electric fuel pump, warm-up regulator and auxiliary air device are now supplied with battery voltage.

## C A U T I O N !

Never (deflect) raise the air-flow sensor plate with the electric fuel pump operating since otherwise fuel will be injected.

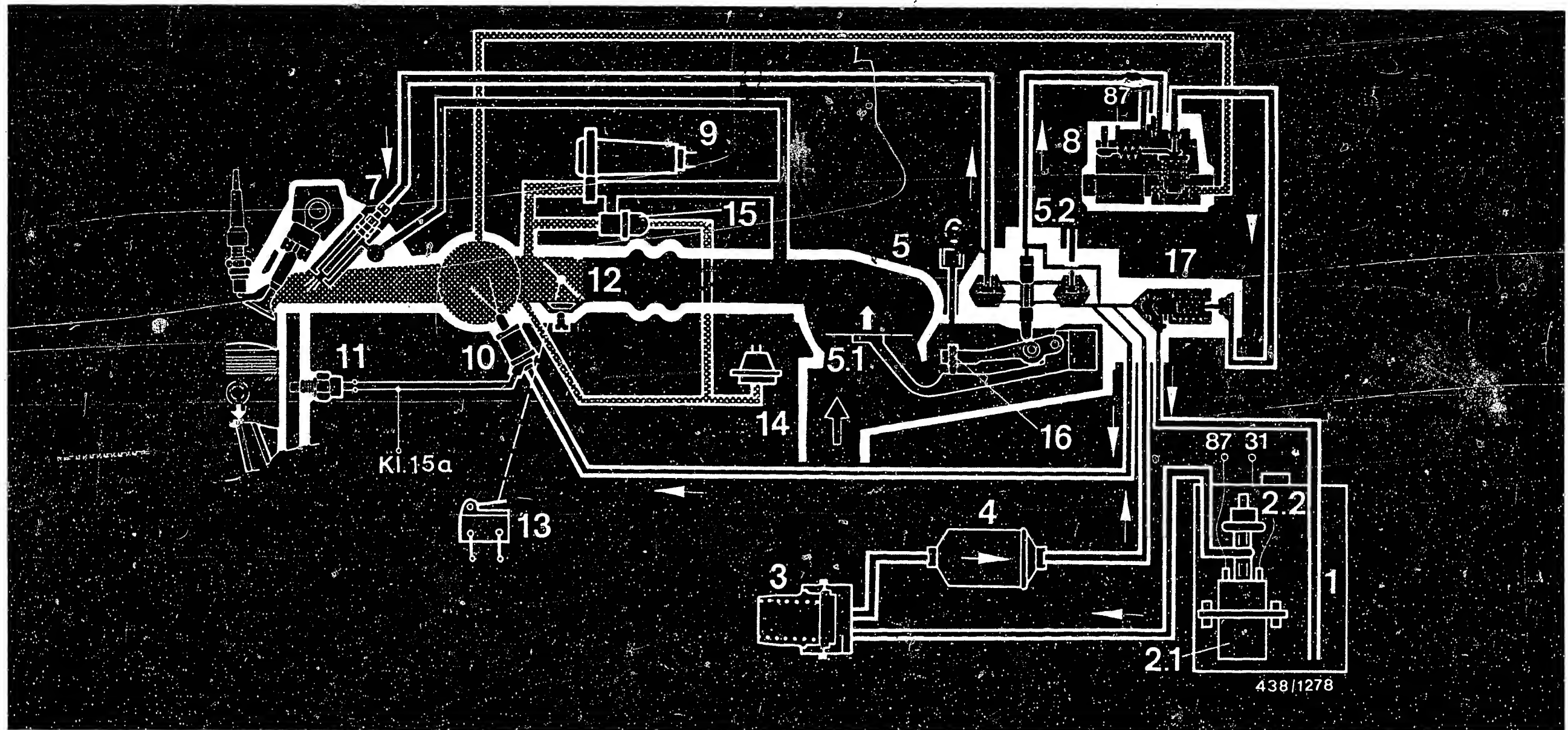
Subsequent operation of starting motor may lead to serious engine damage!

**K9**

Electric safety circuit

Audi 80, VW-Passat/Santana





- |                                  |                          |  |
|----------------------------------|--------------------------|--|
| 1 = Fuel tank                    | 5.2 = Fuel-distributor   | 12 = Throttle valve                                |
| 2.1 = In-tank electric fuel pump | 6 = Anti-tamper cap      | 13 = Microswitch                                   |
| 2.2 = Pressure damper            | 7 = Injection valve      | 14 = Pressure jump switch                          |
| 3 = Fuel accumulator             | 8 = Warm-up regulator    | 15 = Vacuum limiter                                |
| 4 = Fuel filter                  | 9 = Auxiliary air device | 16 = Idle mixture adjusting screw                  |
| 5 = Mixture-control unit         | 10 = Start valve         | 17 = Primary-pressure regulator with push-up valve |
| 5.1 = Air-flow sensor            | 11 = Thermo-time switch  |  |

### 3. DIAGRAM OF FUEL LINES

**K10**

Diagram of fuel lines  
Audi 80, VW-Passat/Santana



**K11**

Diagram of fuel lines  
Audi 80, VW-Passat/Santana



#### 4. General safety instructions for work on the K-Jetronic

- Never deflect (raise) the air-flow sensor plate with the electric fuel pump operating since fuel will be injected through the injection valves.  
Subsequent operation of the starting motor may lead to serious engine damage.
- Follow the instructions on test media for testing the injection valves with valve tester.  
Never test using gasoline or other easily inflammable liquids.  
Even when using special test gasoline, observe the local safety regulations.
- Perform leak test on engine intake system only with permissible leak-detector spray (e.g. Gypoflex).  
Do not use any easily inflammable liquids. Observe local safety regulations.



## 5. SPECIAL FEATURES IN THESE VEHICLES

- Injection valves with fixed air guide cap. By the air shrouding, the mixture formation is improved, especially at idle.

The air distribution takes place in the cylinder head.

KDJE-P 200/19 adapters are necessary to connect these injection valves for the dispersion measurement of the fuel distributor with the tester for delivered quantity comparison.

- The pressure jump switch and throttle valve idle switch for acceleration enrichment.

Below 35°C, the start valve injects briefly on acceleration, conditioned by the thermo-time switch.

The pressure jump switch is tested with ohmmeter and Mityvac hand vacuum pump.

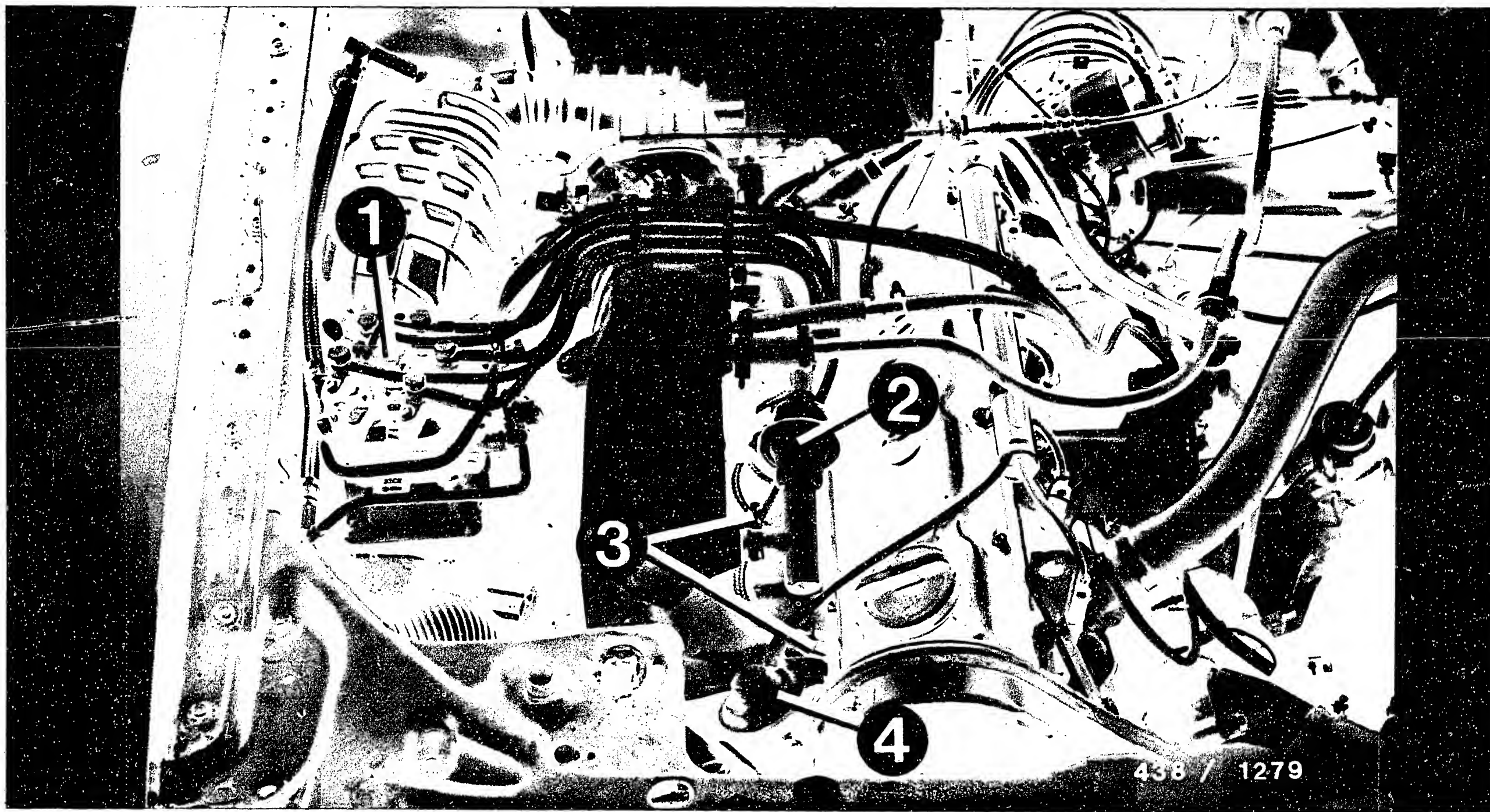
If the pressure jump switch is triggered with vacuum or with atmospheric pressure, the contact is opened ( $\infty \Omega$ ).

On admission of air to the pressure jump switch, the switching contact closes for a short period (0  $\Omega$ ).



- In the Passat and Santana vehicles:  
In-tank electric fuel pump with replaceable non-return valve and screw-mounted pressure damper for noise reduction.  
The unit when completely mounted is latched on the interior to the base of the fuel tank.  
The electric fuel pump is accessible via a closing ring on the fuel tank upper side.
- 5-cylinder mixture-control unit with updraft air-flow sensor.  
Partly with angle sensor (potentiometer) for fuel consumption indicator.
- Vehicles for the Sweden and Switzerland version are fitted with exhaust-gas recirculation.  
Vehicles with manual transmission also have a vacuum limiter.





## 6. INSTALLATION POSITION OF COMPONENTS

### 6.1 Arrangement of components on engine

1 = Mixture-control unit

2 = Vacuum limiter (only in Sweden and Switzerland version)

3 = Injection valves

4 = EGR valve (only in Sweden and Switzerland version)

**K15**

Installation position of components

Audi 80, VW-Passat/Santana



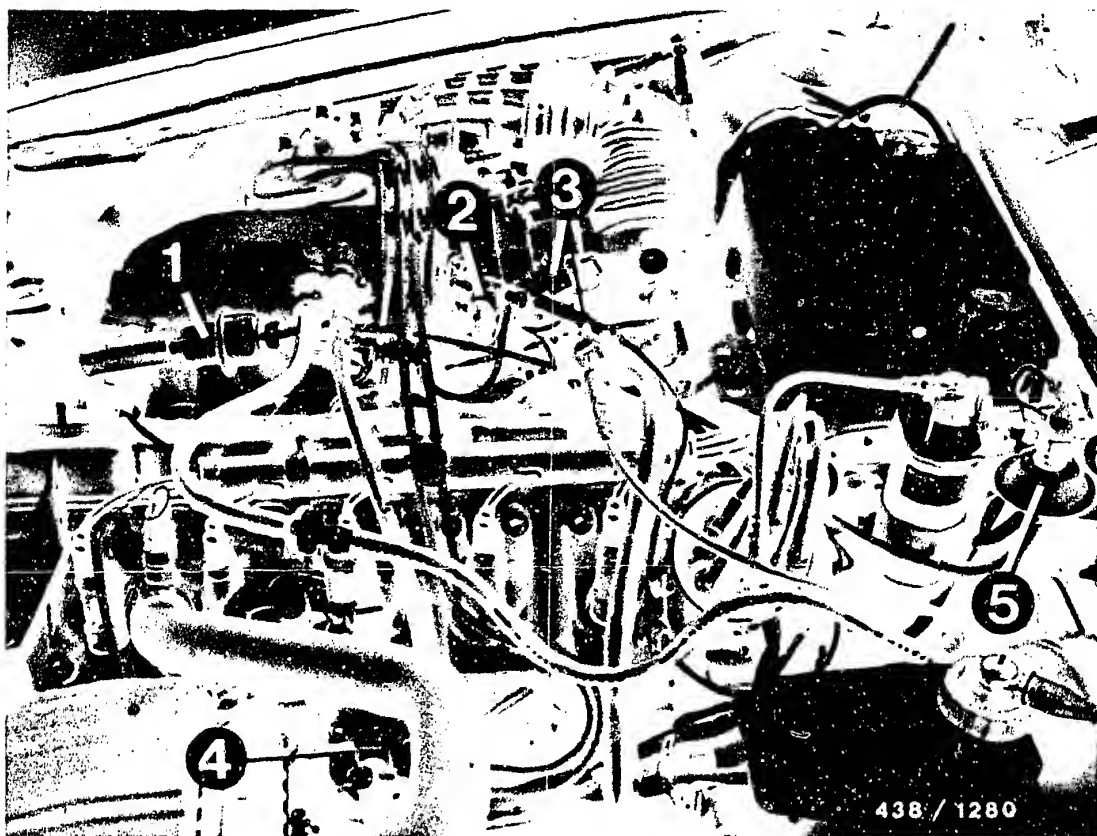
**K16**

Installation position of components

Audi 80, VW-Passat/Santana







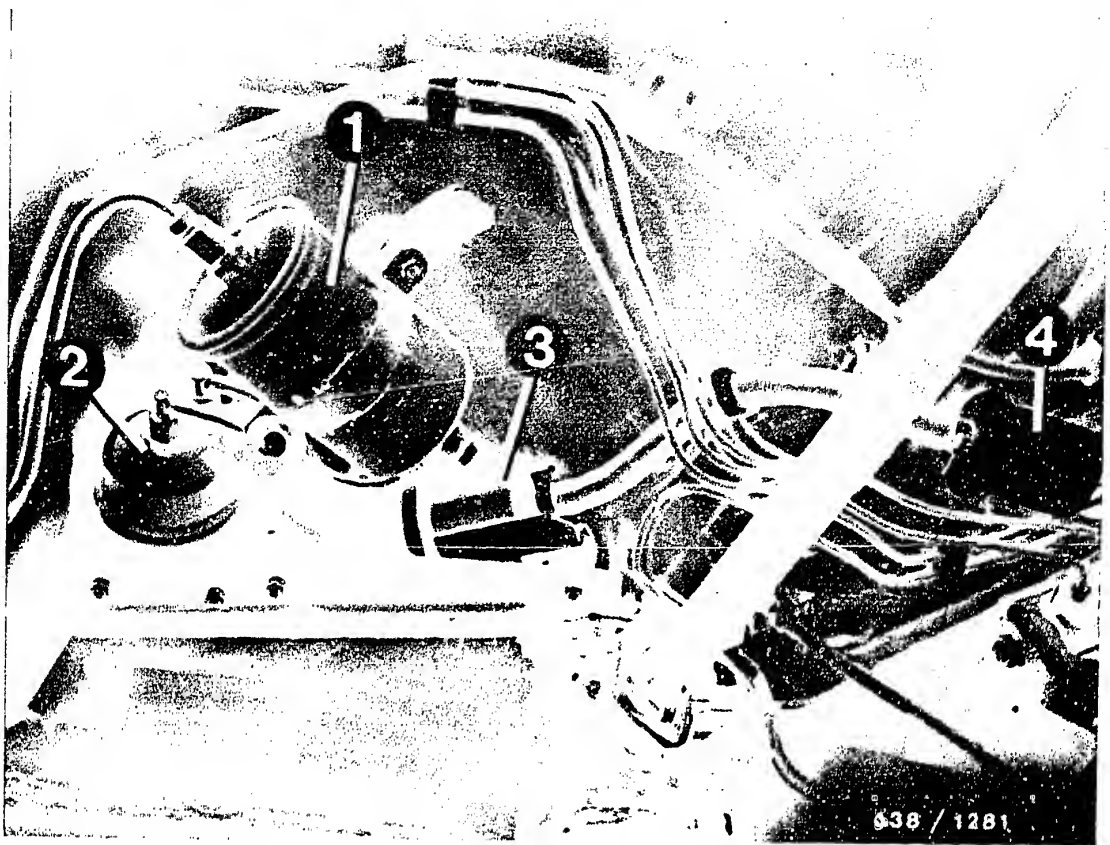
- 1 = Vacuum limiter
- 2 = Start valve
- 3 = Plug connection for the throttle valve idle switch
- 4 = Warm-up regulator
- 5 = Pressure jump switch

**K17**

Installation position of components  
Audi 80, VW-Passat/Santana





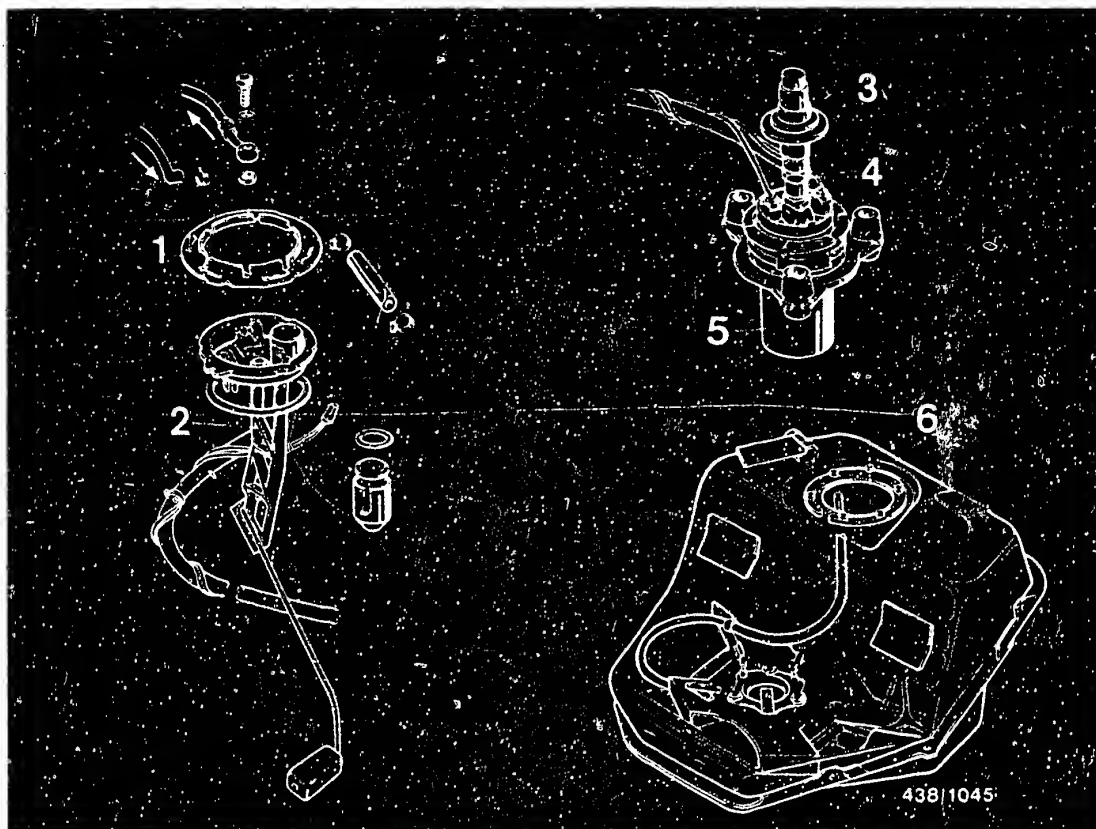


- |                      |                        |
|----------------------|------------------------|
| 1 = Fuel filter      | 3 = Electric fuel pump |
| 2 = Fuel accumulator | 4 = Prefilter          |

### 6.2 Components in fuel supply

- In the Audi 80 and Audi Coupé the components are arranged to the right on the vehicle base in front of the rear axle.





- |                      |                        |
|----------------------|------------------------|
| 1 = Closure ring     | 4 = Non-return valve   |
| 2 = Fuel tank sender | 5 = Electric fuel pump |
| 3 = Pressure damper  | 6 = Fuel tank          |

● VW-Passat and VW-Santana:

The in-tank electric fuel pump with exchangeable non-return valve and screw-fitted pressure damper is accessible via the closure ring on the fuel tank upper side.



# T A B L E   O F   C O N T E N T S

## Section

## Coordinates

1. Special features .....L 2
2. Test specifications .....L 3
3. Electrical safety circuit .....L 8
4. Diagram of fuel lines .....L 12
5. General safety instructions .....L 14
6. Idle stabilization .....L 15
7. Installation position of individual  
components .....L 18



## 1. Special features

- This microcard contains the K-Jetronic trouble-shooting instructions for the following VW models valid at the time of printing:  
Scirocco 16V (EU) 09.85 →  
Golf 16V (EU) 02.86 →
- Injection valves with fixed air-guide caps. The air shrouding improves the mixture formation, particularly at idle. Air distribution is in the cylinder head.  
Adapters KDJE-P 200/19 are required for the connection of the injection valves for measuring the scatter of the fuel distributor with the tester for delivered-quantity comparison.
- Fuel accumulator with 40 cm<sup>3</sup> volume.
- Warm-up regulator with manifold-pressure-dependent full-load enrichment.
- Pressure-jump switch for cold-acceleration enrichment.
- In-tank pre-supply pump.
- Overrun cutoff and idle stabilization.
- Fuel container between in-tank pre-supply pump (fuel tank) and electric fuel pump.
- Note:  
The K-Jetronic in the Golf, Scirocco 16V corresponds basically to that in the Golf GTI.  
Similar SIS repair instructions:  
Microcard VWV-504



## 2. Test specifications

### 2.1 Electric fuel pump

0 580 254 957/958

- Fuel delivery: min. 800 cm<sup>3</sup>/30 s
- Terminal voltage: min. 11.5 V  
under load
- Fuel delivery of  
pre-supply pump: min. 900 cm<sup>3</sup>/30s

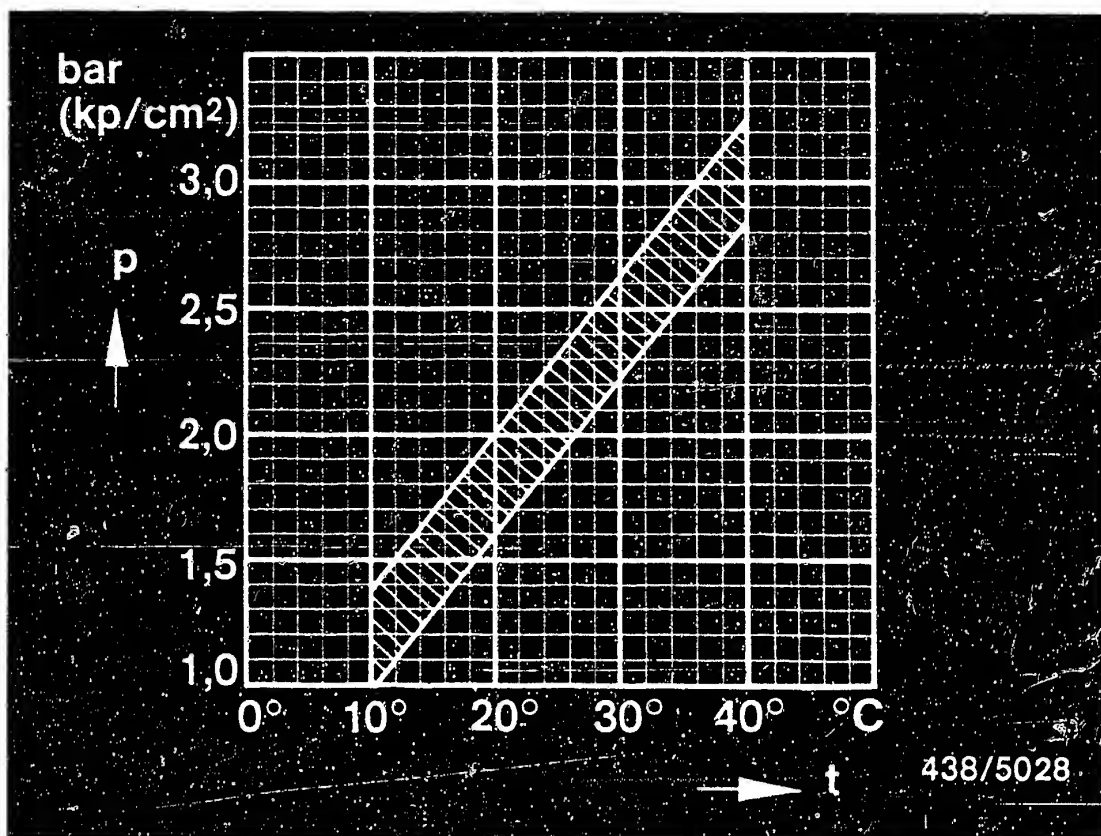
### 2.2 Fuel distributor

0 438 100 140

● Primary pressure*	Checking value	Setting value
	4.7...5.4 bar (4.8...5.5 kp/cm <sup>2</sup> )	4.9...5.1 bar (5.0...5.2 kp/cm <sup>3</sup> )

\* Gauge pressure





p = Control pressure (gauge pressure)  
t = Ambient temperature

### 2.3 Warm-up regulator 0 438 140 140/141 (Version with separate full-load enrichment)

- Fuel delivery for control-pressure circuit: 160...240 cm<sup>3</sup>/min.
- "Cold" control pressure

For testing, connect vacuum pump to intake-manifold pressure connection on warm-up regulator.

Setting value: 400...600 mbar  
(300...450 mmHg)

● "Warm" control pressure \*

Warm-up regulator 0 438 140 140/141  
(Version with separate full-load enrichment)

Testing with atmospheric pressure  
(without vacuum): 2.7...3.1 bar  
(2.8...3.2 kp/cm<sup>2</sup>)

Testing with vacuum  
(Connect vacuum pump to intake-manifold pressure  
connection on warm-up regulator)

Setting values:  
400...600 mbar 3.4...3.8 bar  
(300...450 mmHg) (3.5...3.9 kp/cm<sup>2</sup>)

● Leak test on full-load diaphragm

Max. allowable pressure drop  
from setting value: 100 mbar  
(75 mmHg)/15s

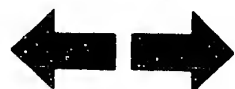
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2.4 Fuel accumulator 0 438 170 040/041

● Leak test

Minimum pressure:*	after 10 min	after 20 min
	2.5 bar (2.6 kp/cm <sup>2</sup> )	2.4 bar (2.5 kp/cm <sup>2</sup> )

\* Gauge pressure





## 2.5 Injection valves

0 437 502 026/027

- Opening pressure: \*

3.0...4.1 bar  
(3.1...4.2 kp/cm<sup>2</sup>)

- Leak test  
not below 2.8 bar: \*

No drop may fall within  
25 sec.

## 2.6 Fuel distributor

0 438 100 140

- Comparative measurement of fuel deliveries

Setting point	max. allowable delivery
Idle 6.0 cm <sup>3</sup> /min Part load 40.0 cm <sup>3</sup> /min	6.6 cm <sup>3</sup> /min 43.0 cm <sup>3</sup> /min
Full load 118,0 cm <sup>3</sup> /min  This quantity must be obtained at least at each outlet.	130,0 cm <sup>3</sup> /min

\* Gauge pressure

**L6**

Test specifications

VW



## 2.7 Thermo-time switch

0 280 130 214/223

### ● Resistance measurement between

at temperature below      above °C          °C		Term. "G" and ground (housing)	Term. "W" and ground (housing)	Term. "G" and term. "W"
+30	+40	25...40 Ω 50...80Ω	0 Ω 100...160Ω	25...40 Ω 50...80 Ω

## 2.8 Idle adjustment

- Idle speed: 950...1000 min<sup>-1</sup>
- CO concentration: 0.5...1.5 vol. %

For adjusting/checking the idle, take apart plug connector (near ignition coil) between term. 1 of ignition coil and idle-stabilization control unit.

Engine oil temperature min. 60°C.

Electrical devices off.

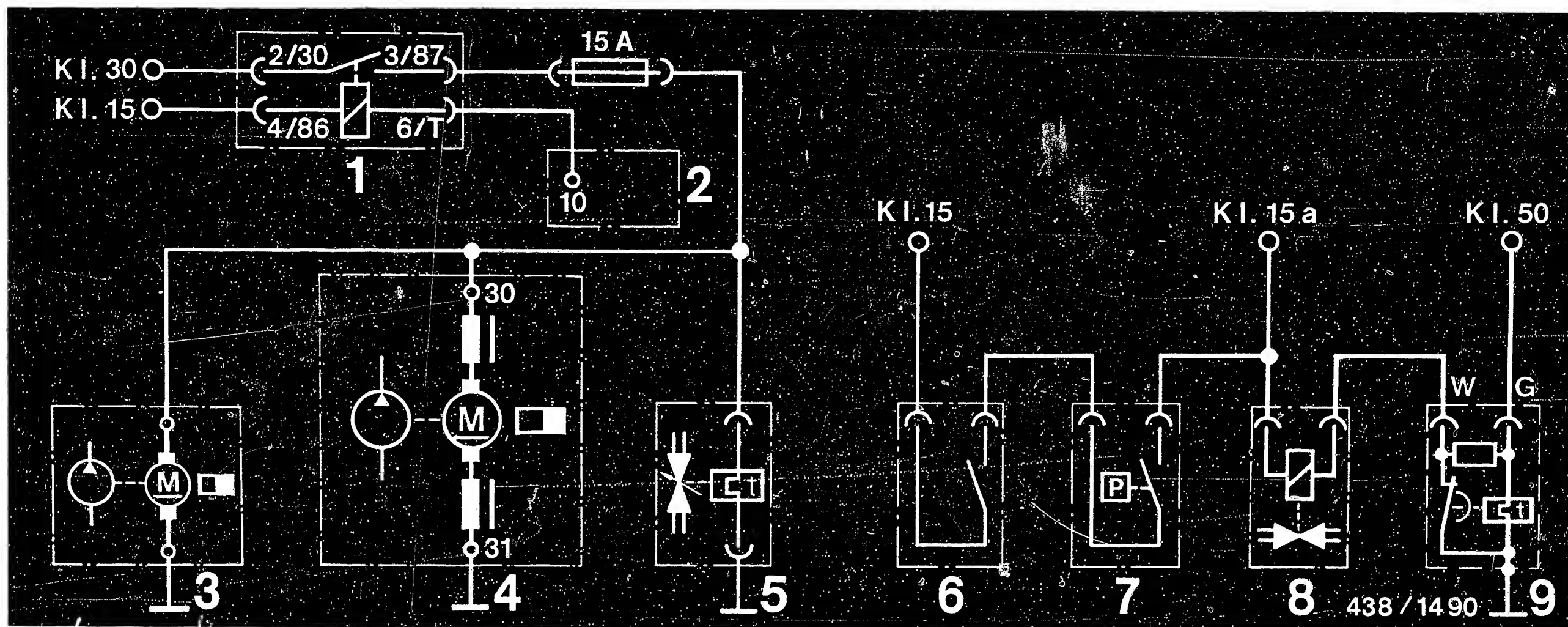
Crankcase ventilation hose disconnected.

**L7**

Test specifications

VW





1 = Fuel pump relay  
2 = Control unit for electronic ignition system  
3 = In-tank pre-supply pump

4 = Electric fuel pump  
5 = Warm-up regulator  
6 = Throttle-valve switch

7 = Pressure-jump switch  
8 = Start valve  
9 = Thermo-time switch

### 3. Electrical safety circuit with cold-acceleration enrichment

#### 3.1 Circuit diagram

The safety circuit with fuel pump relay is energized from terminal 10 of the control unit for the electronic ignition system (supplied with ground).

Cold-acceleration enrichment temperature-dependent through start valve, triggered by pressure-jump switch and throttle-valve switch

**L8**

Electrical safety circuit

VW

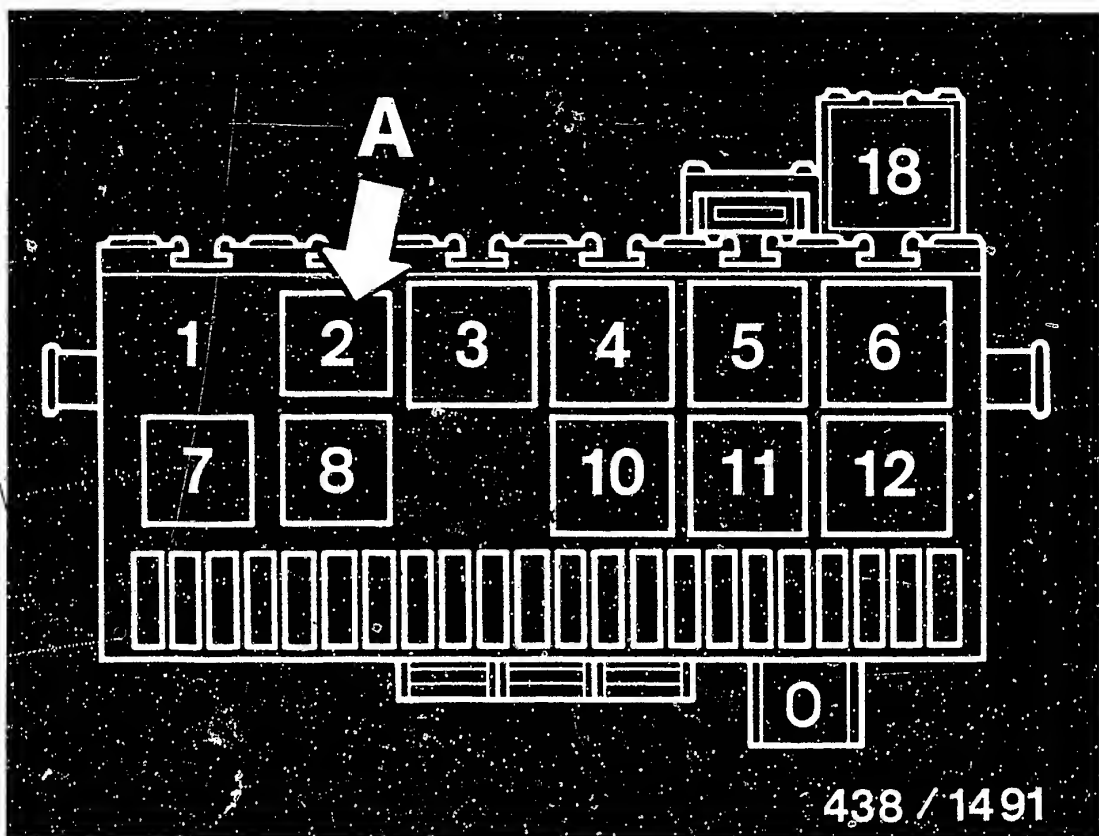


**L9**

Electrical safety circuit

VW





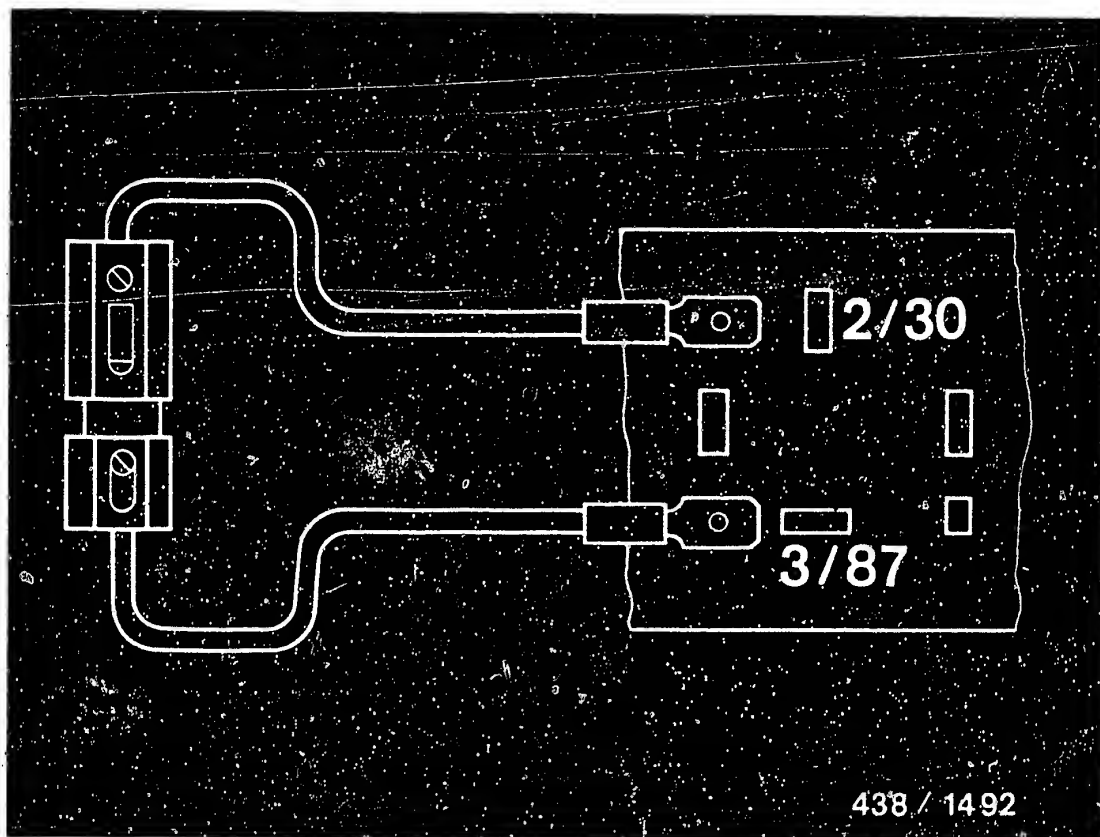
A = Fuel pump relay

### 3.2 Jumping the safety circuit

In order to perform the testing operations with the engine stationary, it is necessary to jump the safety circuit.

To do this, pull fuel pump relay (on left in central-electrics board under instrument panel) out of the relay board.





Using a jumper, connect contacts 2/30 and 3/87 in the relay board.

Use connecting lead 1.5 mm<sup>2</sup> with fuse holder and 16 A fuse.

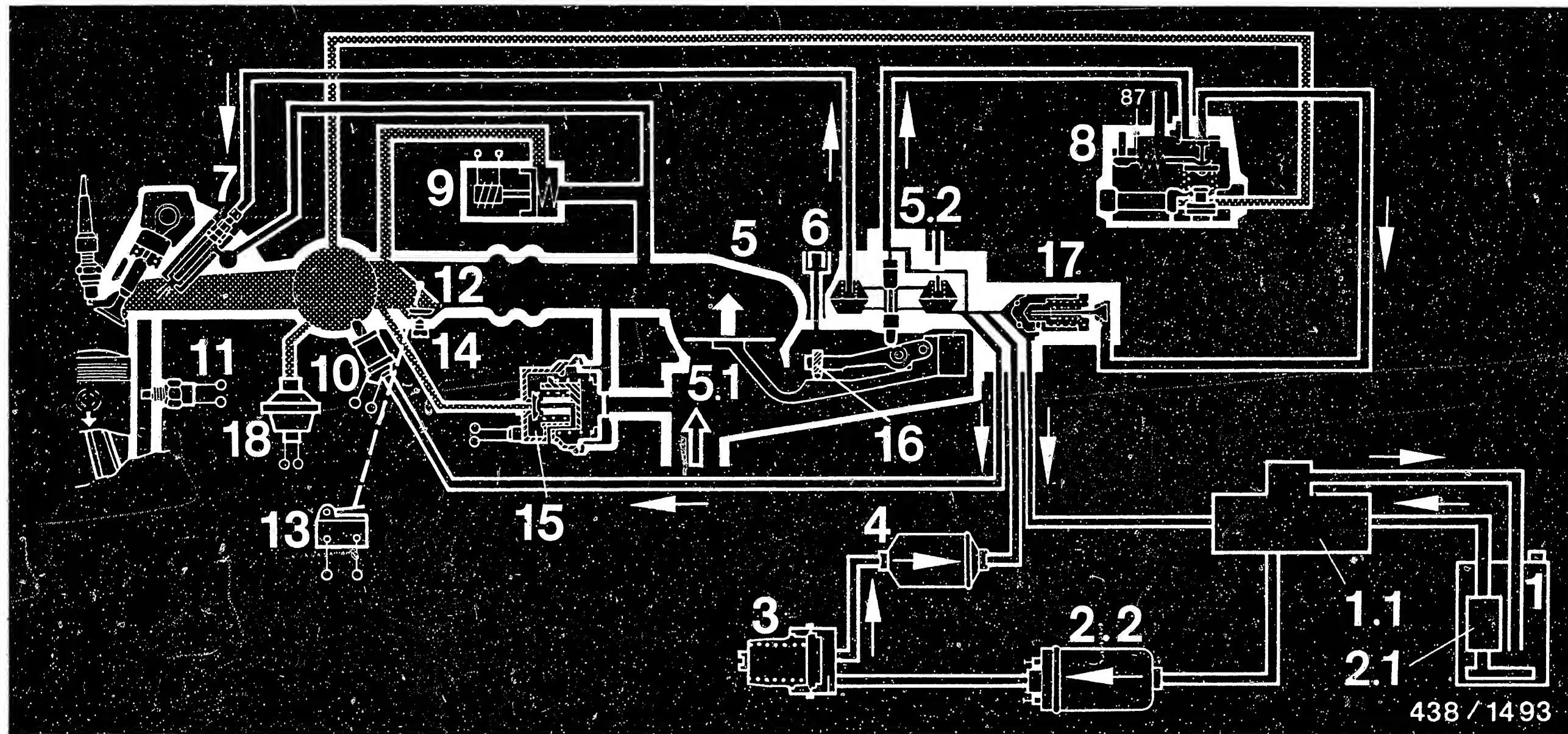
Width of blade terminal: 9.5 mm  
(User-fabricated as per sketch)

Electric fuel pump and warm-up regulator are now supplied with battery voltage.

#### C A U T I O N !

With the electric fuel pump operating, never deflect (raise) the air-flow sensor plate since otherwise fuel will be injected. Subsequent operation of the starting motor may lead to serious engine damage.





- 1 = Fuel tank
- 1.1 = Fuel container
- 2.1 = In-tank pre-supply pump
- 2.2 = Electric fuel pump
- 3 = Fuel accumulator
- 4 = Fuel filter
- 5 = Mixture-control unit
- 5.1 = Air-flow sensor

- 5.2 = Fuel distributor
- 6 = Anti-tamper cap
- 7 = Injection valve
- 8 = Warm-up regulator
- 9 = Idle actuator
- 10 = Start valve
- 11 = Thermo-time switch

- 12 = Throttle valve
- 13 = Throttle-valve switch
- 14 = Bypass screw
- 15 = Overrun cutoff valve
- 16 = Idle-mixture-adjusting screw
- 17 = Primary-pressure-regulator with push valve
- 18 = Pressure-jump switch

#### 4. Diagram of fuel lines

**L12**

Diagram of fuel lines

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**L13**

Diagram of fuel lines

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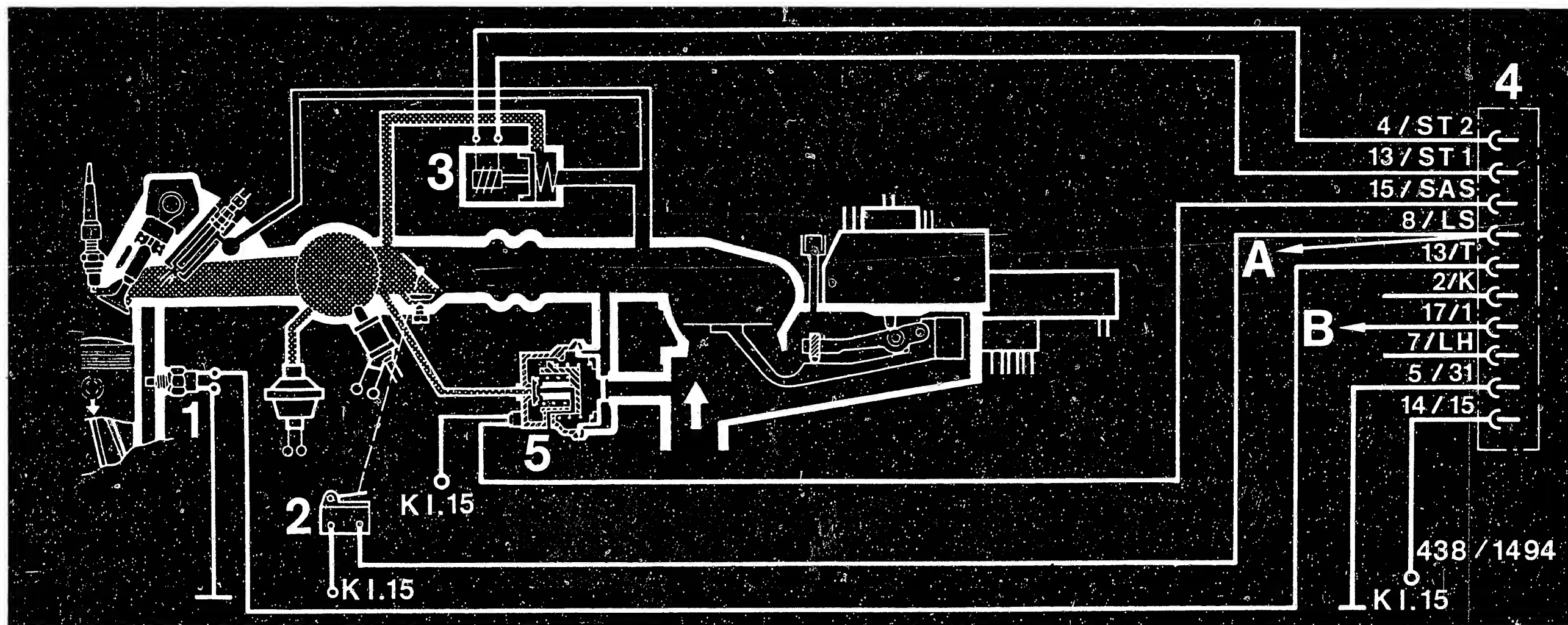


## 5. General safety instructions for work on the K-Jetronic

- With the electric fuel pump operating, never deflect (raise) the air-flow sensor plate since fuel will be injected through the injection valves.  
Subsequent operation of the starting motor may lead to serious engine damage.
- Follow instructions on testing media for testing the injection valves with valve tester.  
Never test with regular gasoline or with other easily inflammable liquids.  
Even when using test gasoline, follow the local safety regulations.
- Leak test on engine intake system only with allowable leak-detector spray (e.g. Gypoflex).  
Do not use any easily inflammable liquids.  
Follow local safety regulations.







1 = Temperature sensor (NTC)  
 2 = Throttle-valve switch  
 3 = Idle actuator

4 = Control unit for idle stabilization  
 and overrun cutoff  
 5 = Overrun cutoff valve

A = Control unit for electronic  
 ignition, term. 6  
 B = Ignition coil, term. 1

#### 6. Idle stabilization and overrun cutoff (not made by Bosch)

The control unit for idle stabilization and overrun cutoff is on a separate bracket above the relay board under the instrument panel on the left.

**L15**

Idle stabilization

VW



**L16**

Idle stabilization

VW



## 6.1 Operating principle of idle stabilization

The idle speed is stabilized by the electronic control unit and the idle actuator. The otherwise customary auxiliary-air device is replaced by the idle actuator in the air bypass around the throttle valve.

From the control unit, the tractive magnet of the idle actuator receives a variably pulsed voltage at constant frequency. As a result of this, the plate in the air channel is adjusted, changing the air throughput.

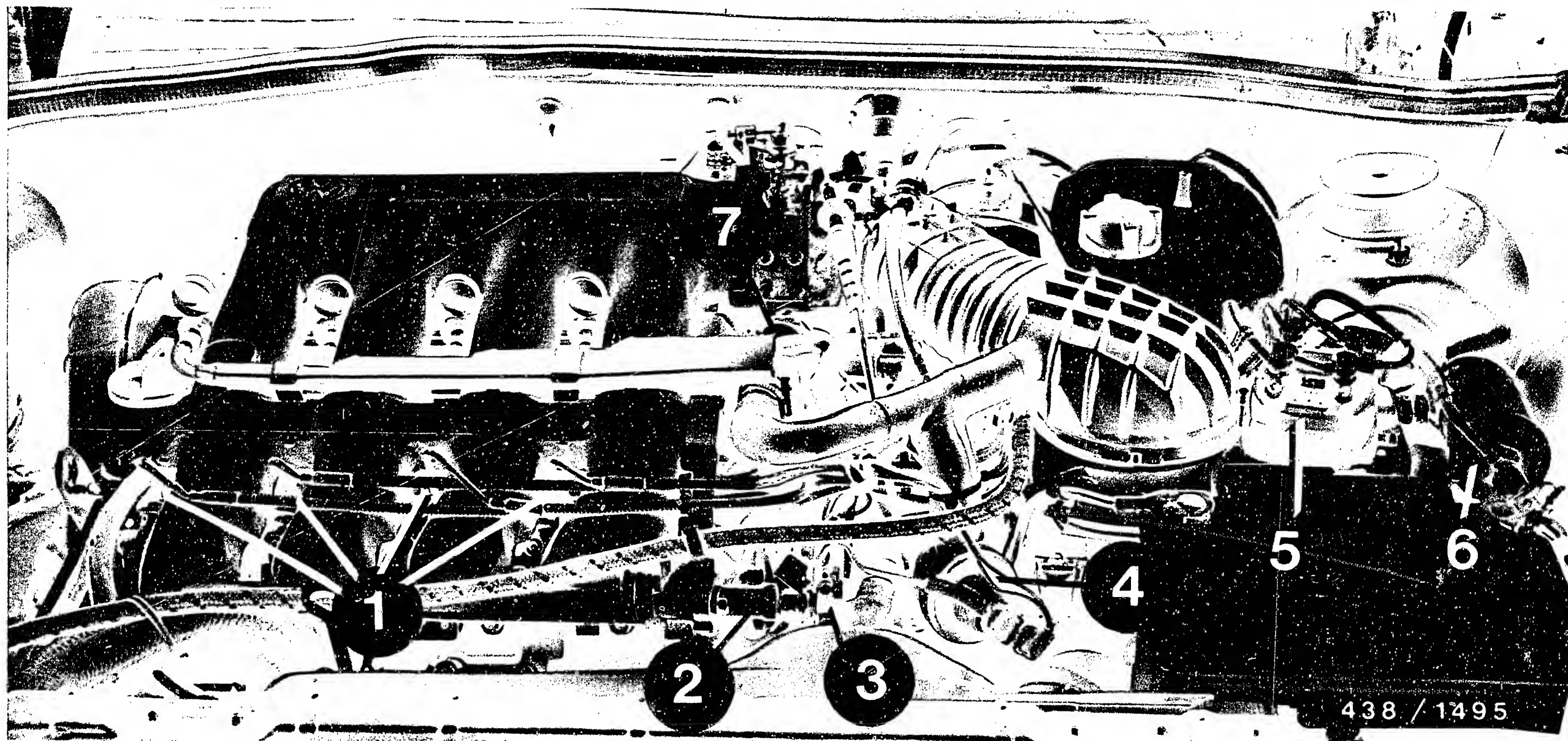
## 6.2 Operating principle of overrun cutoff

The control valve of the overrun cutoff valve is connected directly to term. 15 (positive). The ground connection to the control valve is via term. 15/SAS of the control unit when the following conditions are met:

- Engine oil temperature min.  $+60^{\circ}\text{C}$
- Engine speed greater than approx.  $1400 \text{ min}^{-1}$
- Throttle-valve switch in idle position.

If these conditions are met, the overrun cutoff valve opens the air bypass channel.





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## 7. Installation position of components

### 7.1 Arrangement of components on engine

1 = Injection valves  
2 = Start valve  
3 = Warm-up regulator

4 = Overrun cutoff valve  
5 = Mixture-control unit

6 = Fuel line filter  
7 = Idle actuator

**L18**

Installation position of components

VW



**L19**

Installation position of components

VW





Arrow = Pressure-jump switch

- Thermo-time switch and temperature sensor for idle stabilization and overrun cutoff are near the start valve.

**L20**

Installation position of components

VW



## 7.2 Fuel-supply components

- In-tank pre-supply pump
- Electric fuel pump and fuel accumulator are in the region of the rear axle.

